Western Industry

January 1955

7th Annual Review and Forecast

Western Outlook number

... the entire industrial picture

... viewpoints of the West's leaders

... contributions of Western engineers

... more than 50 industries examined

markets - materials - methods

Oil · Steel · Missiles · Chemicals · Pipe · Soap · Citrus fruit · Glass · Lumber · Aluminum · Margarine · Copper · LP gas · Electronics · Plywood · Rubber

Gas · Aircraft · Instruments · Canning · Plastics · Paint · Computers · Uranium · Coal · Fir doors · Fertilizer · Mining · Railroads · Foundries · Trucking · Cement

Die casting · Frozen foods · Furniture · Pulp and paper

Cooling towers · Atomic energy · Electric power · Meat packing

Automobiles · Hardboard · Electroplating · Dairy products

Adding Strength to Freedom's Wings...

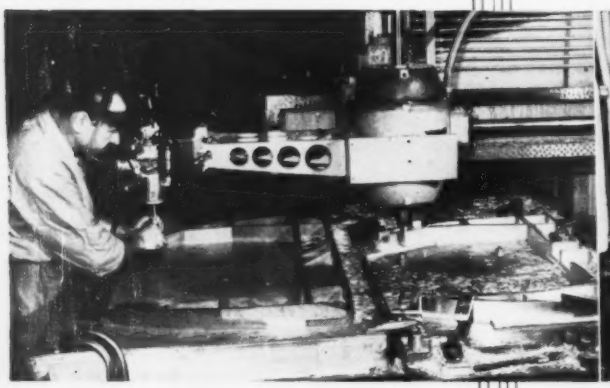
New defender of America's far-flung outposts is the Douglas F4D Skyray, fastest carrier-based jet airplane ever built and holder of the world's speed record.

To make such planes as the Skyray possible, Aircraft Tapered Sheets, Inc., manufactures integrally stiffened structural components of great strength and stability by precision machining and milling of solid blocks of 75-ST aluminum alloy.

Protecting these three-dimensional hydraulic duplicating devices as they turn out their high precision work are the Gargoyle lubricants recommended by the equipment manufacturer.

According to Paul Langston, foreman at the Burbank, Calif., plant, "Our entire production is dependent upon the proper functioning of our hydraulic tracing and duplicating equipment and on the Gargoyle lubricants that help keep them running without breakdown —our confidence in these products has been fully justified."

Precision milling of an aircraft structural element is effected by this hydraulic tracing equipment.



Paul Langston (right) foreman of the Burbank Plant of Aircraft Tapered Sheets, Inc., discusses machine lubrication problems with Wendell Hagen, General Petroleum representative.

SOCONY-VACUUM

GENERAL PETROLEUM CORPORATION

Converting nature's gift for better living

Like so many other West Coast firms, you can place your confidence in the General Petroleum lube engineer and the products he recommends. Backed by more than 88 years of industrial lubrication experience, your nearby G. P. man is trained to save you money, to keep your machinery running better longer... Call him today for a lubrication survey of your plant's equipment.

2-1013

The ambulances of Bowers Ambulance Service, of Long Beach, California, are the products of experts. . . .

Among the finest ambulances made in America are those of the Bowers Ambulance Service of Long Beach, California. From Cadillac Chassis to National Oxygen Regulator, no effort has been spared to select only tested, reliable, dependable equipment. When life hangs in the balance no mechanical trouble must have the slightest chance to tilt the scales against the patient.

Regardless of how much money you care to spend, you cannot buy finer single or two-stage reduction regulators than those made by NATIONAL of California. Whether for minute or vast hourly gas requirements, at very low or extremely high delivery pressures, no regulators will give you better service or more trouble-free performance than will . . . . . National of . . . california

Because only the very finest equipment is chosen, National Oxygen Regulators are "standard" here.

No other regulator is so easy to adjust and no others will hold that pressure adjustment more steadily. Designed and built for the merciful hands of the hospital nurse, the sturdiness of these regulators will withstand the toughest operations in shop or field. Intended to sustain the flickering life of the injured or the ill, it will maintain the finest torch flame adjustment regardless of weather or gas volume.

One touch of the adjusting screw and you will know why NATIONAL of California regulators have won the test of time. Made by an organization with nearly half a century of experience **in the fields of high pressure gas equipment design and manufacture, you can rely upon these products.**

These regulators will require reconditioning but seldom; but, when they do, this job has been so simplified that any competent repair man, anywhere, can do so easily. . .

write for free brochure no. 4 —44 pages packed with interesting information and 30 color and black & white pictures.

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Western Industry

JANUARY 1955

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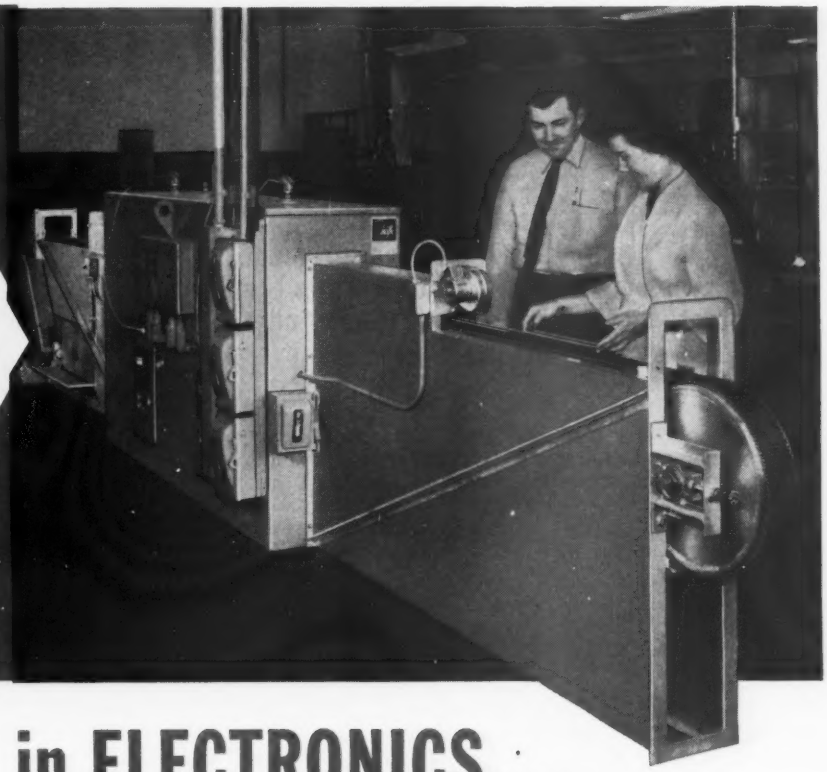
another Pacific built furnace



in ELECTRONICS...

THIS PACIFIC FURNACE PROVIDES CONSISTENT ACCURACY AT LOWER COST ...MAINTAINS QUALITY CONTROL ON PRECISION ELECTRONIC PARTS!

Absolute accuracy in firing a metallic film to a ceramic core is a critical requirement in making precision resistors at Litton Industries. Formerly, this job was done in a batch-type oven—with the resulting slowness, extra handling and attention needed to maintain uniform results from load to load.

However, when Litton installed this new Pacific Curing Furnace, temperature repeatability was maintained to within ± 3° F.—quality control was guaranteed from one day to the next. The completely automatic, conveyor-belt operation increased production speed and efficiency by reducing handling—eliminating waste time and motion.

Pacific was the only furnace maker who would guarantee Litton a uniform, controlled accuracy to their exacting specifications of repeatability!

Whatever the size or type job, there's a Pacific Industrial Furnace built to *your* exact specifications. And our engineers are always available—without obligation—to discuss your heat treating problems. Call or write today!

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Seattle
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Pacific ELECTRIC HEAT TREATING EQUIPMENT

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1430 Grande Vista Ave., Los Angeles, Calif.

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_____(type of job)

☐ Information on the full line of Pacific Heat Treating Equipment.

☐ Please have a Pacific Representative call.

Name_____
Company_____
Address_____
City_____ State_____

SHOWING FOR THE FIRST TIME - - -

A New Addition to the Dempster-Dumpster System of Low Cost Bulk Materials Handling

Now you can have either of two types of Dempster-Dumpsters in the fastest, most efficient and lowest cost method of bulk materials handling ever devised.

IN THIS MODERN, low cost system, one truck-mounted Dempster-Dumpster picks up, hauls and empties, or sets down intact, one loaded detachable Dempster-Dumpster Container after another, regardless of design or size, handling bulk materials of practically every description.

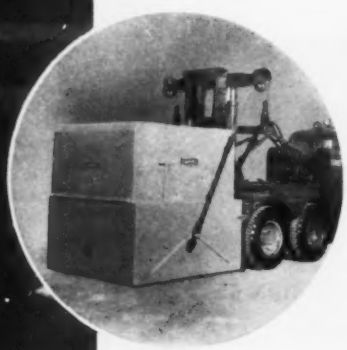
The new Dempster-Dumpster Type DTLF offers several desirable features along with all the economies provided by the Type LFW. These features include: (1) Improved load distribution with container carried in more forward position between wheel centers. (2) Extreme high dumping in cases where it is desired. (3) Vertical pick up of loaded container. (4) Container, loaded or empty, is always in horizontal plane in carrying position. Automatic locking device for positive rigidness of container while in carrying position is, of course, provided.

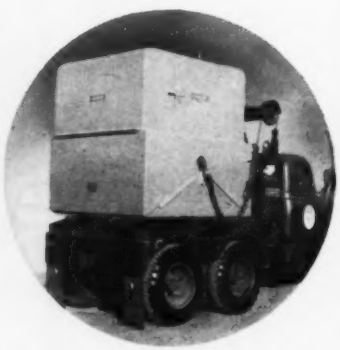
TREMENDOUS SAVINGS WITH THE DEMPSTER-DUMPSTER SYSTEM HAVE BEEN PROVED BEYOND QUESTION.

One truck-mounted Dempster-Dumpster, operated by only one man, the driver, serves scores of containers of various capacities up to three times greater than the average dump truck. You eliminate trucks standing idle . . . eliminate re-handling of materials . . . eliminate loading crews. You increase efficiency, sanitation and good plant-keeping.

Containers range from 2 to 21 cu. yds. capacity for use with recommended type Dempster-Dumpsters. Each container is designed to suit the materials to be handled—be they trash, rubbish, liquids, dust, bulky, light or heavy. Many leading plants, in almost every type of industry, have found it indispensable after installation. Its proved savings alone justifies an investigation of its potential value in your plant now. Write to us today for complete information. Manufactured and sold exclusively by Dempster Brothers, Inc.

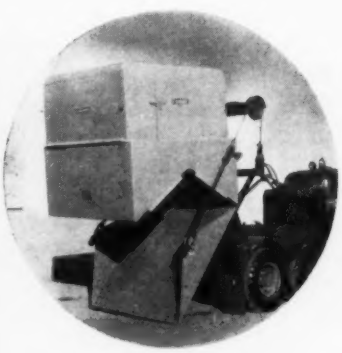
The photo at left illustrates the amazing ability of the Type DTLF Dempster-Dumpster for high dumping. The three photos below show the Pick Up, Haul and Dumping action, hydraulically controlled from cab.





DEMPSTER

Photo above shows the new Dempster-Dumpster Type DTLF dumping 8 cu. yds. of rubbish. At right you see the Type LFW with load in carrying position. Dempster-Dumpsters are available in capacities capable of handling up to 38,000 pound payloads.



One Truck-Mounted
Dempster-Dumpster Handles Scores
of Containers... All Designs... All Sizes

R **B R O T H E R S** **515 N. Knox, Knoxville 17, Tennessee**

No, Mr. P. A., you don't do it that way

Can you picture a Purchasing Agent on this job—doing piping maintenance work? No—his headaches are many, but this isn't one of them. Yet he can help the Maintenance Dept. plenty—for he's a key man in getting the best valves for every service.

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OSTUCO internally upset tubing processes faster

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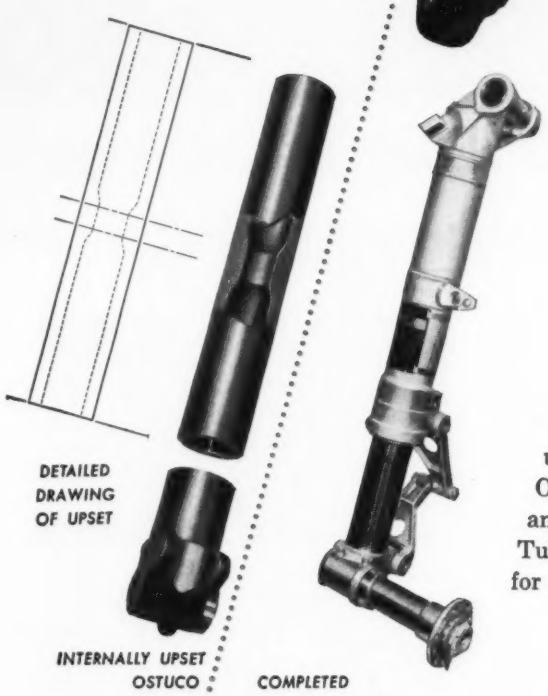

DETAILED DRAWING OF UPSET

INTERNALLY UPSET OSTUCO TUBING

COMPLETED GEAR ASSEMBLY

Landing gears, manufactured by The Cleveland Pneumatic Tool Company for North American Aviation's F-86H, have piston tubes machined from internally upset OSTUCO tubing. The upset construction of these *special-quality* OSTUCO tube forgings keeps machining to a minimum and permits faster processing. Savings are 25% . . . or $4.95 per unit.

Special-quality OSTUCO tubing produces stronger, lighter products . . . better looking products at greater savings. Its uses are practically unlimited. Wherever you use tubing *in any form*, OSTUCO's single source service can save you time and money. Write for helpful booklet "Ostuco Tubing," or better still, send us your blueprints for immediate quotation.

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117 Liberty Street, New York 6, New York

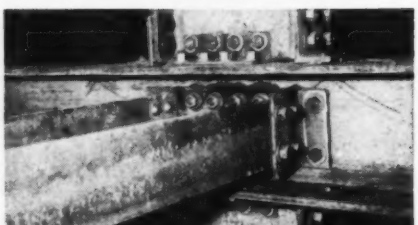
All field connections in new Equitable skyscraper are made with RB&W high-strength bolts!

First San Francisco skyscraper to go up since adoption of the city's strict 1948 earthquake code, the new 25-story Equitable Life Assurance Society building features a unique design of tapered steel columns and butterfly-shaped spandrel beams in outside walls.

A landmark in architectural design, the structure also makes news on another count — all field connections are made with RB&W high-tensile-strength bolts.

This proven fastening technique provides greater strength (important in dealing with earthquakes!) at less actual cost. And the faster installation it permits often slices erection time by weeks!

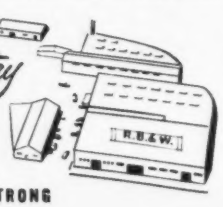
An important installation like this underlines the fast-growing acceptance of high-strength bolting for tough jobs that place a premium on speed and strength. Find out why RB&W is in the lead in this technique by writing for our catalog, "High-Strength Bolts for Structural Steel Connections." 4-32A



CLOSE-UP of RB&W high-strength bolts in Equitable's new skyscraper. Architects: Loubet & Glynn Associates and W. D. Peugh; Irwin Clavan, consulting. Gen'l contractor: Dinwiddie Construction Co., San Francisco. Steel erector: Consolidated Western Steel Div., U. S. Steel Corp.

See our insert on high-strength bolts in Sweet's Architectural File

RB&W *serves Western industry with the complete quality line*

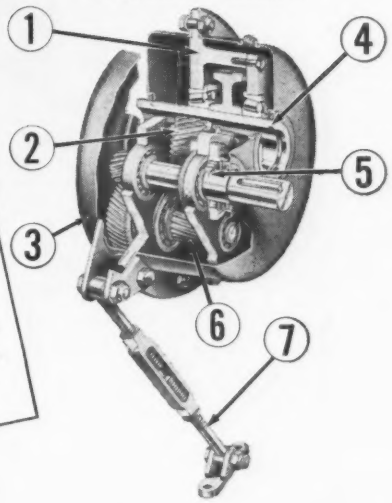


WEST COAST PLANT: 4466 Worth St., Los Angeles, Calif. Other plants: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill. Additional sales offices: San Francisco, Dallas, Chicago, Detroit, Pittsburgh, Philadelphia. Sales agents: Seattle. Distributors from coast to coast.

100 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

IMMEDIATE DELIVERY
...from West Coast Stock
Units and spare parts in Factory Stock at Oakland, California and Portland, Oregon. Authorized stocking Falk Distributors throughout the West.

These famous FALK "In-built" factors *mean long life and dependability...*



1 **All-steel Frame,** with more than double the rigidity of iron, supports all rotating elements.

2 **Precision Helical Gears,** designed and machined by Falk, rated to AGMA standards.

3 **Pressed Steel Housings,** whose sole function is to keep oil in, dirt out; easily removed for gear inspection without dismounting unit.

4 **Through Hollow Shaft** with counter bore provides for easiest installation or removal from driven machine shaft extensions.

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6 **Positive Lubrication,** continuous direct dip of revolving elements at all speeds.

7 **Tie Rod** and turnbuckle serve as anchor and facilitate V-belt or chain adjustment.

SIX SIZES
- 1/2 to 30 hp
- Single or double reduction
- Wide output speed range—420 to 10 rpm

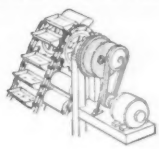
FALK
ALL-STEEL
Shaft Mounted Drives—
simple-compact-rugged-efficient

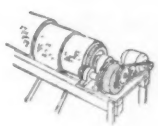
Created specifically for the vast number of applications demanding a sturdy and compact speed-reducing unit for direct mounting on the driven shaft, the new Falk all-steel Shaft Mounted Drive is built to give long service life at substantial savings of space, time, power and maintenance costs!

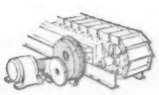
This efficient helical-gear drive, latest in the unmatched list of Falk precision-gearing achievements is an ingenious modification of the time-tested Falk Motoreducer design which has held, for more than 20 years, recognized leadership in this branch of highest-quality power transmission . . . It complements and completes the world-famous Falk line of reduction units covering the entire range of industrial applications.

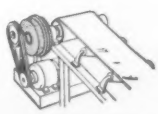
Investigate the Falk all-steel Shaft Mounted Drive. Write to Department 247 for engineering bulletin, including selection and dimension details.

A FEW TYPICAL APPLICATIONS


BUCKET ELEVATOR


SAND CLASSIFIER


APRON FEEDER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THE FALK CORPORATION, Milwaukee 8, Wisconsin

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- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
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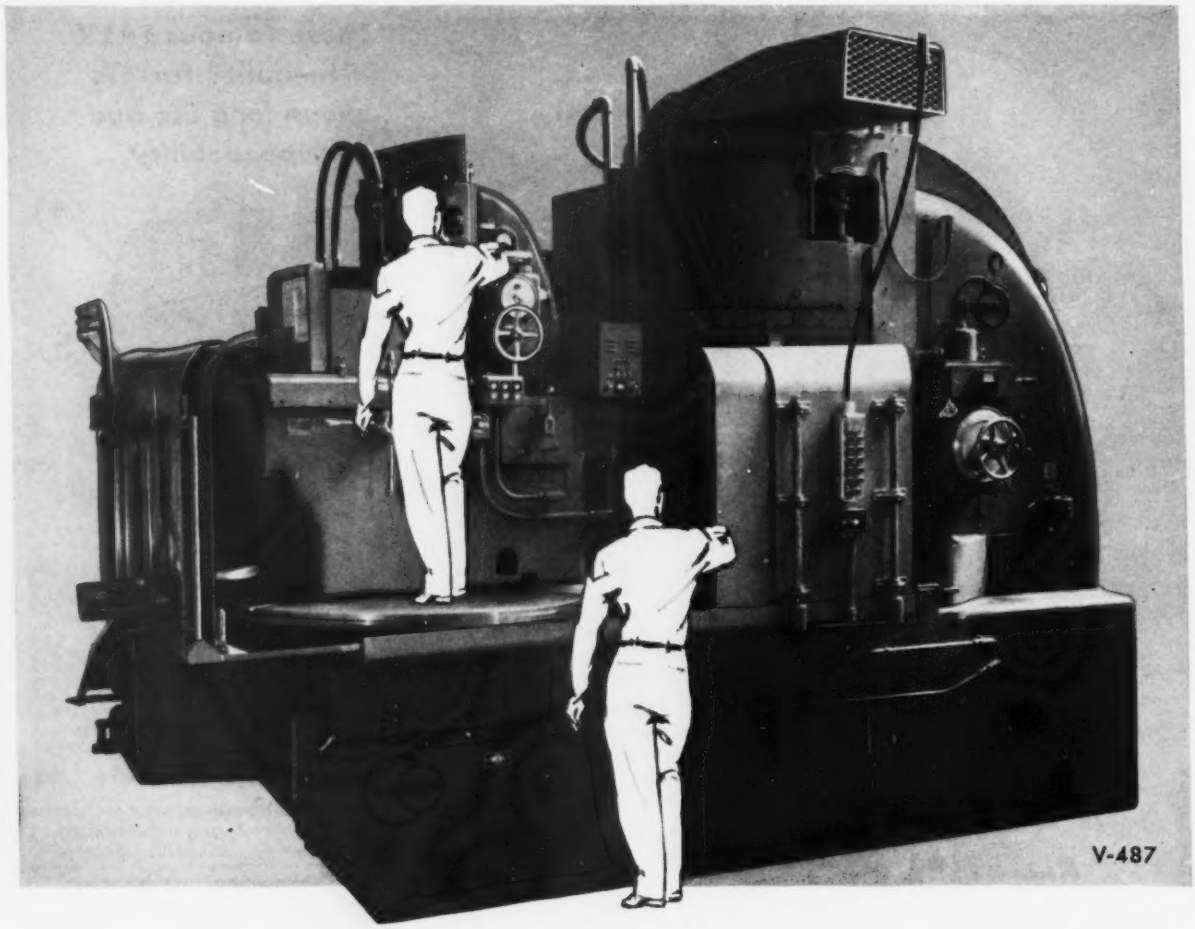
FALK

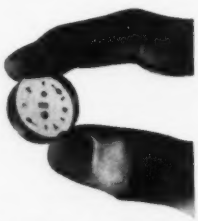
. . . a good name in industry



WE PUT ONE BLANCHARD ON ANOTHER

. . . to show you the wide range of sizes!

It's true! There's no "trick" photography involved. Our 5,400-lb. No. 11 Blanchard Surface Grinder fits snugly on the 84" chuck of our giant 61,000-lb. No. 42-84. And, like all Blanchards, both have chucks flat within .0002" – guaranteed!



Do every surface grinding job in your shop *perfectly* . . . whether you grind tiny watch parts – steel plates 7 feet across corners – or anything in between . . . *put it on a Blanchard.*

Whatever your requirements for stock removal, tolerances or surface finish, ask for details on the 15 standard Blanchard models today. One of them will fill your needs perfectly and will do your work with speed and precision – at costs which help you set competitive prices.

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "The Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

an AMFORGE analysis can mean savings for you

In this particular case, production costs had to be cut. Quality could not be sacrificed. These were the problems placed before AmForge engineers. Careful analysis showed upset forging to be the best method of producing the parts. This decision resulted in a thirty-five percent savings in material costs alone . . . almost $2500 on an order for 1000 pieces. In addition, the customer saved expensive freight and machining costs.

This is typical of the "cost-conscious" service AmForge offers its customers. Behind the solution to this and similar problems involving forged parts, is AmForge skill and experience . . . gained in over 50 years in the forging field. Engineering ability and constant research enable AmForge engineers to accurately analyze a problem and recommend the most efficient and economical method of production.

Through the years, our customers have learned to depend upon AmForge for improved quality forgings and reliable service. And now, with a new upset and press plant in Azusa, California, AmForge is prepared to offer West Coast manufacturers all the benefits of this forging "know-how."

Let us analyze your forging problems. Just send us a sketch, blueprint or sample. We'll do the rest. No obligation, of course.

AMFORGE DIVISION

109 N. WABASH AVENUE, CHICAGO 2, ILLINOIS

PLANTS: AZUSA, CALIFORNIA • CHICAGO, ILLINOIS

Whether you need a major installation or individual materials handling and power transmission products . . .

put Link-Belt's *West Coast*

● experienced engineering

Link-Belt is a world-recognized engineering firm. Our West Coast plants and offices have large engineering staffs with intimate knowledge of local conditions. Each plant is prepared to carry through complete installations from planning, manufacture and erection.

● convenient warehousing

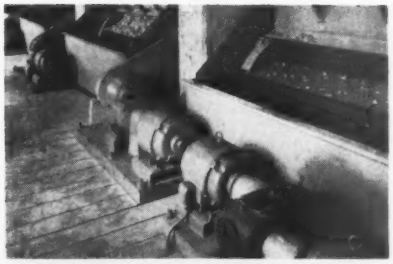
In the seven major Western industrial areas, Link-Belt maintains over-the-counter service on a complete range of power transmission, conveying and elevating products. There are factory branch stores to serve you at Spokane, Seattle, San Francisco, Salt Lake City, Portland, Oakland and Los Angeles. In addition, 32 authorized stock carrying distributors in the West stock Link-Belt products.

FREIGHT TERMINAL

Link-Belt Trukveyor speeds schedules, reduces loss and damage claims at large over-the-road trucking terminal. Up to 71 warehouse trucks with 1000-lb. loads can be moved at one time.

facilities to work for you

Here's a unique, all-inclusive service for West Coast industry. Our localized facilities offer complete engineering, manufacture and erection of entire plants or of individual conveying, elevating, processing and power transmission products. Get all the facts from the Link-Belt office near you. You'll find it pays to do business with Link-Belt.



PAPER MILL

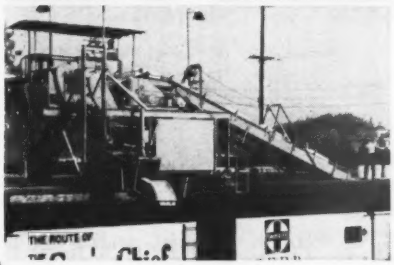
Link-Belt engineered these rotary chip feeder and drive installations—consisting of rotary vane feeders, P.I.V. variable speed drives, couplings, helical gears, base plates and roller chain drives.

GRAIN TERMINAL

In addition to designing complete system of 16 belt conveyors, Link-Belt supplied bucket elevators, car pullers, unloading scoops, enclosed gear drives, roller bearing pillow blocks, couplings, chutes at this grain terminal.

● modern fabricating facilities

Link-Belt operates three modern plants in the West—at San Francisco, Los Angeles and Seattle. Not only do these facilities help speed deliveries—they also save money on freight costs compared to Eastern shipments.



R. R. CAR ICING

For the Santa Fe, Link-Belt Dock Type Car Icers can ice 900 cars of perishables a day. Each of the three mobile machines is push-button controlled.

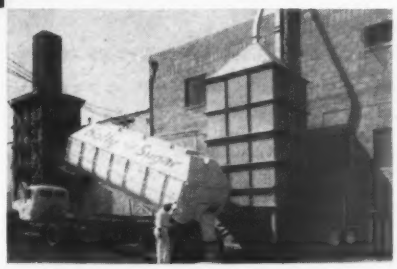
SEWAGE TREATMENT

San Francisco's Southeast sewage and sludge treatment plant has Link-Belt Straightline bar screens, grit collectors and sludge collectors. North Point plant also has Link-Belt equipment.

LINK-BELT

One source . . . one responsibility for materials handling and power transmission machinery

LINK-BELT COMPANY: Plants, Sales Offices and Factory Branch Stores at San Francisco 24, Los Angeles 33, Seattle 4. Sales Offices and Factory Branch Stores at Portland 10, Spokane 10, Oakland 7, Salt Lake City 1. Stock Carrying Distributors in Principal Areas. 13,708



FRUIT PROCESSING

Lower handling costs, a better product result from automatic bulk handling of sugar at this frozen citrus concentrate plant. Link-Belt engineered and installed Bulk-Flo system.

It's easy to

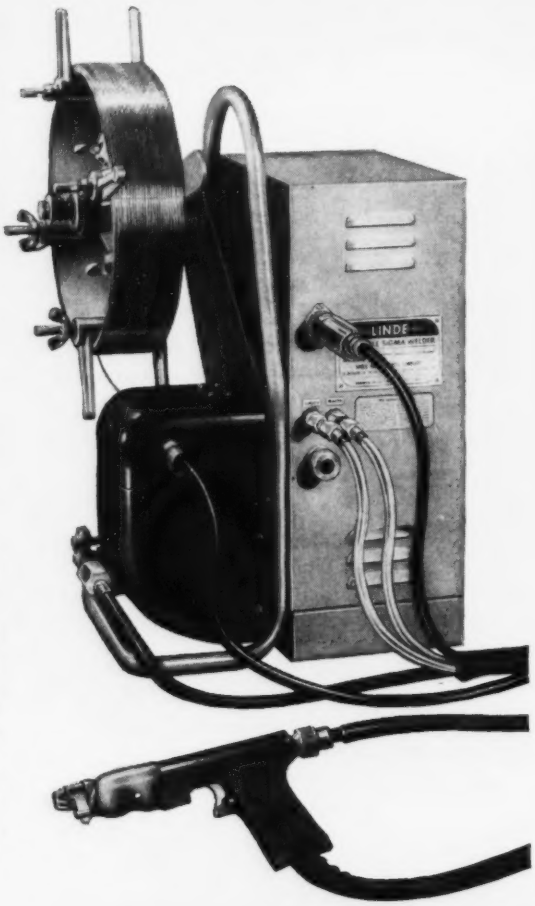
CUT WELDING COSTS

when you use a High-Speed

LINDE SWM-2

Trade-Mark

Portable Sigma Welder



Your welding department can easily make high-speed, low-cost fusion welds in aluminum, stainless steel, high temperature alloys, copper, carbon steel, and other metals with the LINDE SWM-2 Portable Sigma Welder. The LINDE SWM-2 is a complete control unit for manual sigma (Shielded Inert Gas Metal Arc) welding operations. It mechanically feeds welding wire from a coil into the weld area at a steady precontrolled rate and supplies a regulated quantity of argon to shield the weld from contamination by the atmosphere. No flux is used. In most cases the smooth, clean sigma welds need no post-welding treatment.

SIMPLIFIED AUTOMATIC OPERATION

The operator merely presses the trigger of the pistol type torch to energize the control circuit and start the flow of water coolant and argon gas. When an arc is struck by touching the consumable electrode to the workpiece, the wire feed automatically begins.

NEW CONSTANT POTENTIAL POWER SUPPLIES CAN BE USED

Either ordinary or constant potential DC power supplies can be used with a LINDE SWM-2. In constant potential welding arc voltages are preselected and held with outstanding consistency which permits positive starts and high-speed welds on thin metals.

Call your nearest LINDE office today for more information on how you can cut production welding costs with the LINDE SWM-2 Sigma (Shielded Inert Gas Metal Arc) Welder. Or write for your free LINDE SWM-2 catalog.

Production jumped 300% when the Heller Engineering and Manufacturing Company, Lynwood, California changed to sigma welding to fabricate aluminum engine shipping stands. Because the sigma welds were clean and sound, post-welding treatment was practically eliminated.

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Linde
Trade-Mark

Leading steel producers report reduced production costs with Permanente 84 because:

1. Permanente 84 lasts up to 50% longer than other bottom maintenance materials in both open hearth and electric furnaces.
2. Down-time for maintenance of bottoms, banks and tap holes is drastically reduced.
3. Far less material is required.

For these reasons, Permanente 84 *costs less* than materials with a lower initial cost. The superior performance of Permanente 84 also makes it your *economical buy* for new bottoms.

Order Permanente 84 now, for bottom, bank and tap hole maintenance or rebuilds—and get extra tonnage at lower cost per ton!

Call or write Kaiser Chemicals Division, *Kaiser Aluminum & Chemical Sales, Inc. Regional Sales Offices: 1924 Broadway,* OAKLAND *12, California . . . First National Tower,* AKRON *8, Ohio . . . 518 Calumet Bldg., 5231 Hohman Avenue, Hammond, Indiana* (CHICAGO).

Kaiser Chemicals

Pioneers in modern basic refractories

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AIM* for SECURE, EFFICIENT PACKAGING with

Acme Wire Stitching Ideas

Acme Idea Man William W. Allen of Denver, worked with The Gates Rubber Company officials on this efficient packaging system.

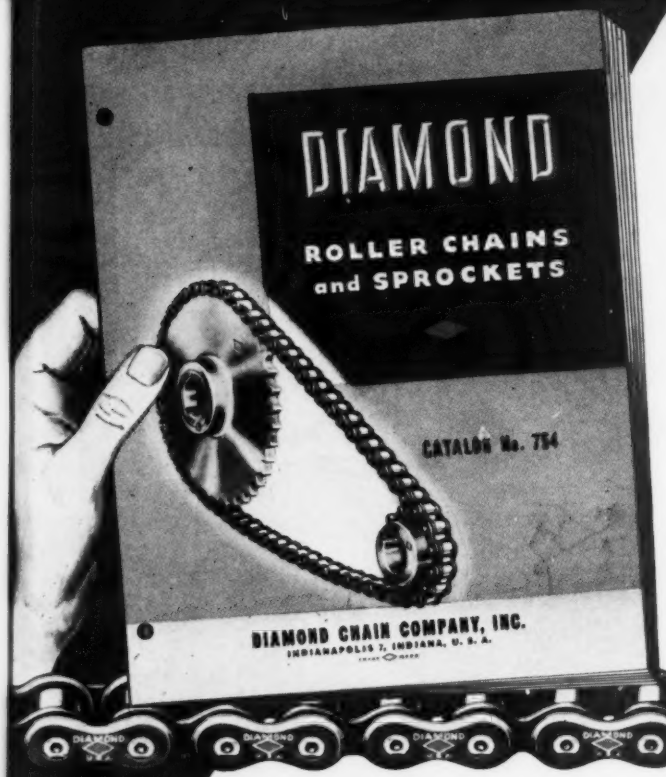
ask your
*Acme Idea Man
to help solve your
problems

The Gates Rubber Company, one of the largest manufacturers of rubber products, not only has enjoyed savings in shipping time and materials for 15 years with Acme Steel Wire Stitching, but also the benefits of increased packaging production. Recent conversion to the new Acme Steel ARCUATE Wire method on Acme Silverstitchers (Idea No. 436) has brought about even further savings . . . with greater packaging and shipping efficiencies as a result. Addition of Acme Steel Strapping, according to the Gates Rubber Company, has produced shipping containers of superior qualities.

Let your Acme Idea Man show you the multiple advantages of Acme Steel Wire Stitching and Acme Steel Strapping as applied to your individual shipping and packaging problems. Call him, or write Acme Steel Company, Dept. HJ-15, 4903 Pacific Blvd., Los Angeles 58, California. Offices also located in San Francisco, Portland, and Seattle.

AIM *For Safe, Lower-Cost Shipping*

ACME STEEL



Here's the Very Latest on Roller Chains 64 Pages of Important Data and Information

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• In this new complete catalog are data and information compiled by our engineering department—information based on 65 years of experience in the production and application of Roller Chains and Sprockets for power drives, secondary drives, timing, lifting, conveying, coordination of several machinery functions, etc.

A CONSTANT HELP— A READY REFERENCE

Here is a compact source of information and data on stock Roller Chains and Sprockets. Engineers and production men will find this comprehensive 64-page Catalog 754 is a time-saver in selection and correct application. Write today, or mail the coupon for a copy.

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Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

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- ✓ Selecting a STOCK Roller Chain Drive
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- ✓ Single and Multiple Strand Chain Weights, Tensile Strengths, and Prices
- ✓ Sprockets for Reboring, Stock Finished-Bore and Taper-Bushed Sprockets.
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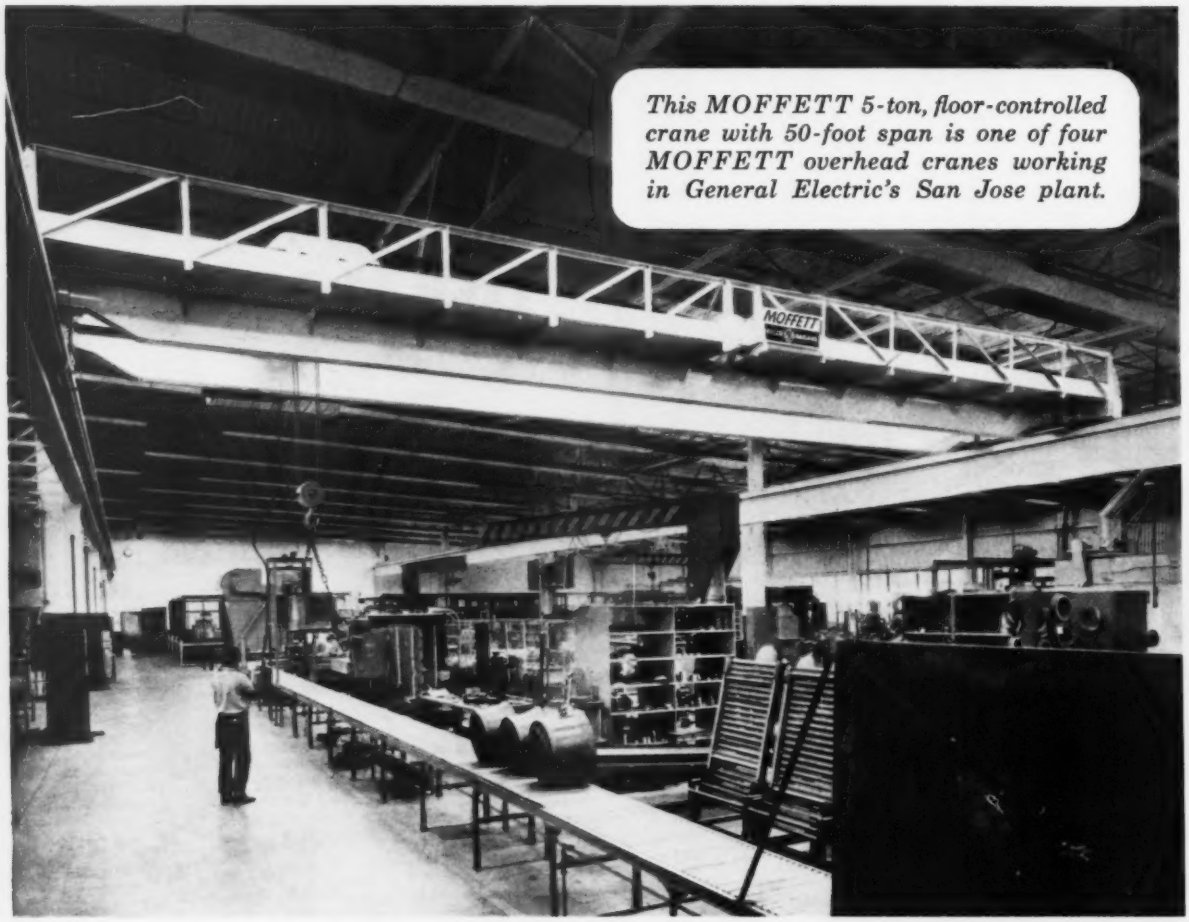

This MOFFETT 5-ton, floor-controlled crane with 50-foot span is one of four MOFFETT overhead cranes working in General Electric's San Jose plant.

To keep things moving, get a MOFFETT "plant individualized" overhead crane 1/4 to 650 TONS

An overhead crane is a capital investment that's productive like a lathe or milling machine, yet structurally a part of your building. Because it keeps things moving, safely, overhead, out of aisles, you're able to get more production from less factory space. To make sure this key piece of equipment is right for your operation, get it "plant individualized" by MOFFETT.

Often you can make substantial savings in plant design, if you consult us in the planning stages – particularly if you have special materials handling problems.

MOFFETT engineers are old hands at designing special features into cranes to improve their productivity. In most cases, you get fast, personal service because you work directly with the engineers designing your crane, thus avoid red tape and foul-ups.

Why settle for less than a

"plant individualized" crane?

Call us NOW. No obligation.

10

MOFFETT CRANE TYPES • continuous duty • heavy industrial duty intermittent duty • powerhouse • standby • steel mill • gantry • special purpose

PAY AS YOU DEPRECIATE. Take advantage of new, faster depreciation schedules... replace older cranes and outmoded material handling methods with modern MOFFETT cranes. Call us for help on pay-as-you-depreciate financing.

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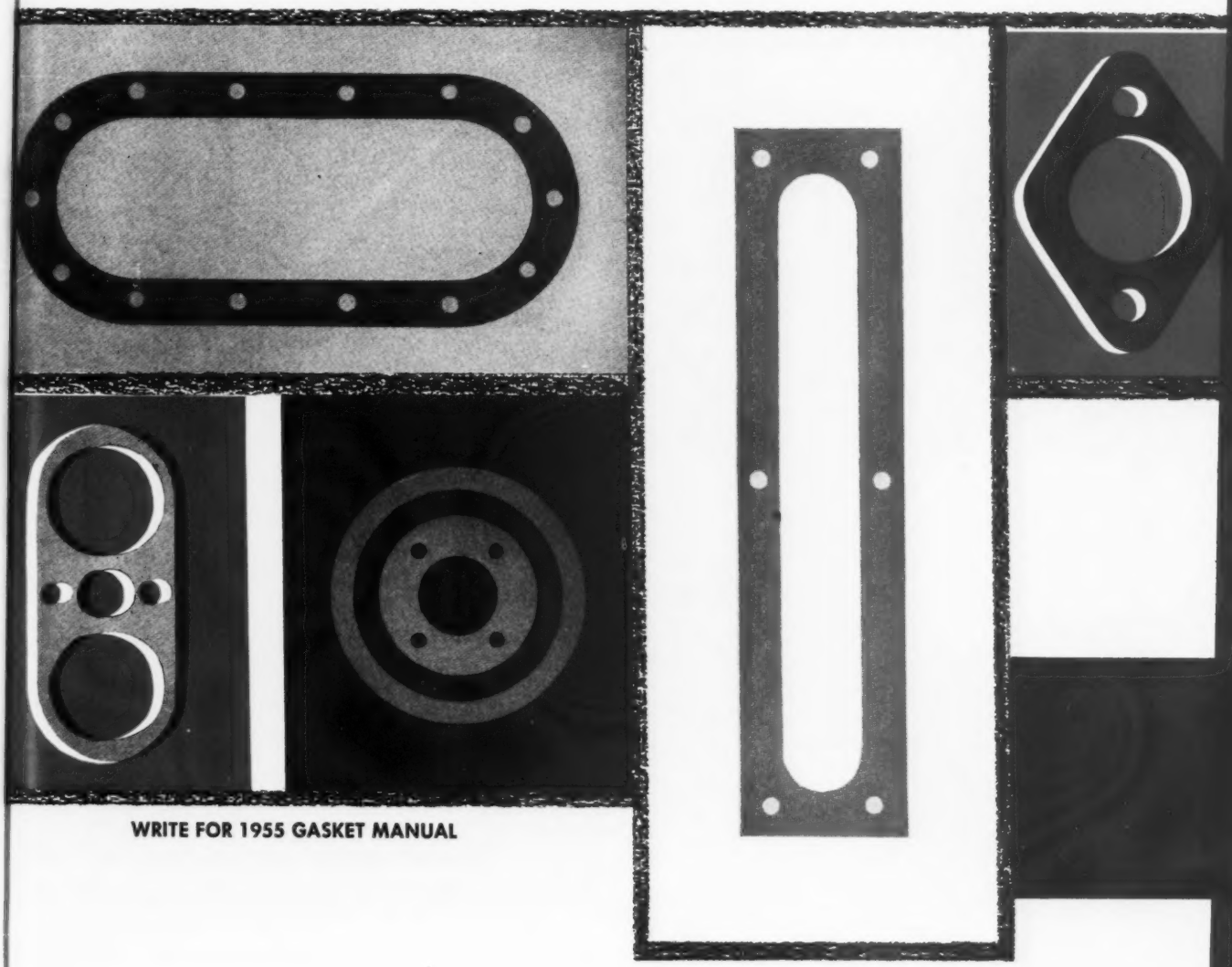
GASKET MATERIALS



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A. B. BOYD COMPANY

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Light in weight, extra strong, smooth and tough, Kennett equipment is built for a lifetime of hard service.

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This forming operation at Gilro Machine & Stamping Co., Oakland, Calif., is typical of applications where it pays to select the one right steel. Beginning in the open hearth, steel from USS is made to do one specific job and do it best at lowest cost.

You can save money

USING THE ONE RIGHT STEEL!

For every job, there is *one particular steel* that best suits the need. Evaluating your requirements and interpreting them into steel is our business. Forming, drawing, stamping, rolling, bending, painting —these are all things to be considered.

And with the one right steel you get more efficient production, fewer rejects, higher quality in your finished product.

Isn't there some place in your plant where the one right steel could be saving you money today? One call to a Columbia-Geneva Technical Field Representative could be the answer to your problem.

Free!

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Please send me your free wall chart showing weights, standard sizes, and gauges of steel sheets.

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USS Steel Sheets

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UNITED STATES STEEL

See better with → QUALITY LIGHTING

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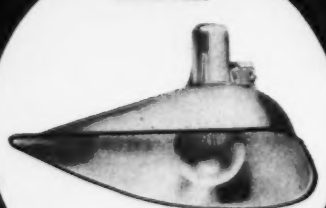
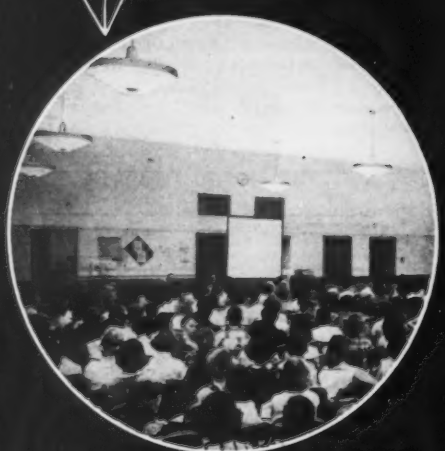


FLOODLITE AREAS

Vision is a source of knowledge. To increase learning ability, increase vision. SMOOT-HOLMAN "QUALITY" lighting fixtures are engineered for the classroom. Sturdy concentric rings of the CIRCL-LITE offer the greatest efficiency of low-brightness indirect illumination. A comfortable, better controlled light for the rigid requirements of classroom seeing. Dust free, contemporary designs are a major advancement of classroom beauty. Approved by the State of California Division of Architects as EARTHQUAKE PROOF. You can apply other SMOOT-HOLMAN "QUALITY" lighting fixtures to your lighting needs. Specify and Install "QUALITY"—THERE IS A DIFFERENCE—



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INGLEWOOD, CALIFORNIA
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design with QUALITY felt in mind!

Gaskets, washers, wick lubricators are just a few applications of felt. Felt reduces vibration, controls noise, seals oil in, water out. American makes many types of felt, in rolls, sheets, and in parts cut to your blueprints, ready for assembly. Tell us what you make, or are designing, and we will send technical information along with our suggestions.

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FREE! *Catalog containing 47 samples of felts plus 24-page booklet of Wool Felt Standards. Write for Catalog 185-52.*

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PACIFIC COAST: A. B. BOYD CO., 1253 Howard St., San Francisco, also 763 E. 14th St., Los Angeles 21, Calif., 733 So. E. Union Ave., Portland 4, Ore., 404 Dexter Ave., Seattle 9, Wash.
PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.; Westerly, R. I. ENGINEERING AND RESEARCH LABORATORIES: Glenville, Conn.

Special Fasteners AT WORK

You just can't use standard fasteners on some jobs. That's why Bethlehem Pacific bolt and nut plants turn out a wide range of "specials" in addition to a complete line of headed-and-threaded products. Just give us the details. And we'll make them to order.

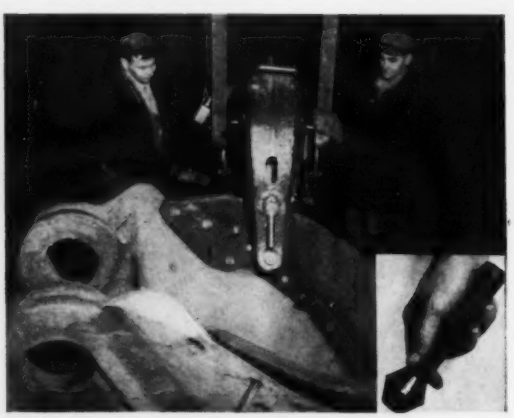
All three plants—at Los Angeles, South San Francisco, and Seattle—have the most modern types of heading and threading equipment. And they're located to serve users throughout the West. Let our nearest sales office quote you a price on fasteners—either standard or special.

U-BOLTS FOR TRUCK AXLES

The special high-strength U-bolts supplied by Bethlehem Pacific hold spring leaves to the axle of a Trailmobile trailer. We harden and temper these ⅞-in.-diam. bolts, made of high-carbon steel, to provide the high tensile strength required when the springs are subjected to loads up to 14 tons. Assembly is done in Trailmobile's plant in Berkeley.

42-FT TIE RODS FOR WATER TANK

Four workmen completed the installation of 470 Bethlehem Pacific tie rods in just four days in the building of this 3-million-gallon water storage tank for the city of Pleasanton, Calif. 42-ft long and ⅞-in. square, the rods are upset and threaded at each end. Each rod is tightened to a predetermined stress-point by means of a heavy nut. Installed by McGrath Steel Co. for Zaballos Bros., general contractors for the 130-ft diameter tank.



BIG RIVETS FOR GOLD DREDGE BUCKETS

The Natoma Gold Dredging Co. of Natoma, Calif., usually operates 20 or more hours a day. The heavy steel lips or cutting edges of the 102 buckets take a lot of punishment as they chew through heavy river silt 70 ft below the surface. When lip replacement is necessary they use jumbo-size rivets produced by Bethlehem Pacific. The photo shows a bull riveter used to drive home the special cone-head rivets, 1⅛-in. diam., which we supply in lengths of 4½ in. and 5½ in.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, San Francisco, Portland, Seattle, Spokane

BETHLEHEM PACIFIC

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CRANE HOIST GIVES LIFT TO H-BOMB!

Operation Ivy was more than a test of the fire and fury of the H-Bomb. It was also a test of the stamina and reliability of American equipment. Based on Eniwetok, 6000 miles from home, equipment and machinery had to keep operating day and night without time consuming breakdowns. For this reason, only the very finest equipment could qualify for this history making test. Crane Hoist Engineering Corporation was selected by Holmes & Narver, Inc., Engineers and Constructors in charge of the project, to design and engineer overhead materials-handling equipment!

Month after month, 24 hours around the clock, working in this humid, tropical climate and torrential rains, Crane Hoist equipment did its job without breakdown and without delay!

Put the rugged dependability of Crane Hoist equipment to work for you. Whatever your load lifting requirements, Crane Hoist Engineering Corporation offers you maximum efficiency and economy of operation and maintenance.

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Western Industry EDITORIALS

The West's industrial conference

READERS OF WESTERN INDUSTRY, as you peruse—or better yet. study—this Western Outlook number, consider yourself in attendance at the West's largest and most important industrial conference.

Not an ordinary get-together-in-a-hall affair, because to round up in one place at one time the 10,500 people in industries of all kinds throughout the West who constitute WESTERN INDUSTRY'S readership is an obvious impossibility.

Quite the opposite is this conference you are now attending. You stay at your desk and the conference comes to you in the form of an assembling in the pages of this Western Outlook number of the high-lights of essential information about the conditions and problems faced by the West. Many people in many industries have given thought and time to supplying facts and figures. Many miles of travel by WESTERN INDUSTRY editors and an unbelievable amount of desk time are required to produce the Western Outlook number.

This "conference," as we term it, is a vital necessity, for the West is so big, so diverse, that its various areas often only dimly discern their close relationship and feel their common tie, namely, the fact that they are all part of a new and different region where a new way of life for the nation is being spelled out and a new pattern of business and industry being set.

Bon voyage

A STAFF CHANGE this month on WESTERN INDUSTRY calls for editorial mention. The name of C. Lloyd Thorpe, consulting technical editor for the last six years, comes off the masthead, to our great regret. The reason: he is leaving the San Francisco Bay area, where his consulting services were easily available, to become general manager of Willamette Iron and Steel Corp. in Portland. Although he has been personnel and public relations manager for five years of the Guy F. Atkinson Co. in South San Francisco, one of the West's largest heavy contracting firms, his previous background was all in the manufacturing field.

His counsel has done much to orient WESTERN INDUSTRY to the trend of production management in the West and to visualize editorial opportunities. For instance, to him belongs much of the credit for the inspiration and planning of the survey of plant management in 211 plants in the West which was conducted by WESTERN INDUSTRY in cooperation with universities and management consultants. The results, published in this magazine in 1950, attracted wide attention because of the striking comparisons they drew between those plants operating under the more advanced methods generally in vogue in the East and the "native" Western plants which had not yet adopted these systems and practices.

Deductible research

IF DONATIONS to educational institutions for research purposes were made deductible, as charitable and religious contributions now are, new impetus to basic research would be provided, according to Dr. Paul E. Klopsteg, associate director of the National Science Foundation, speaking at the American Association for the Advancement of Science meeting in Berkeley last month.

"The risk capital that has supported basic research through the years has paid off handsomely," he said. "In the long run, the results benefit every citizen; they are therefore in the national interest, and public funds should pay the cost.

"In a country which takes great and justifiable pride in private enterprise, why should not more of the financial support come from private sources, and correspondingly less from government?"

While admitting government will always have to supply part of the funds, Dr. Klopsteg warned against the development of a welfare state in science and education, with all basic research financed by the government. "Were this to happen, how could freedom from domination by individuals with ambitions to build empires be maintained?"

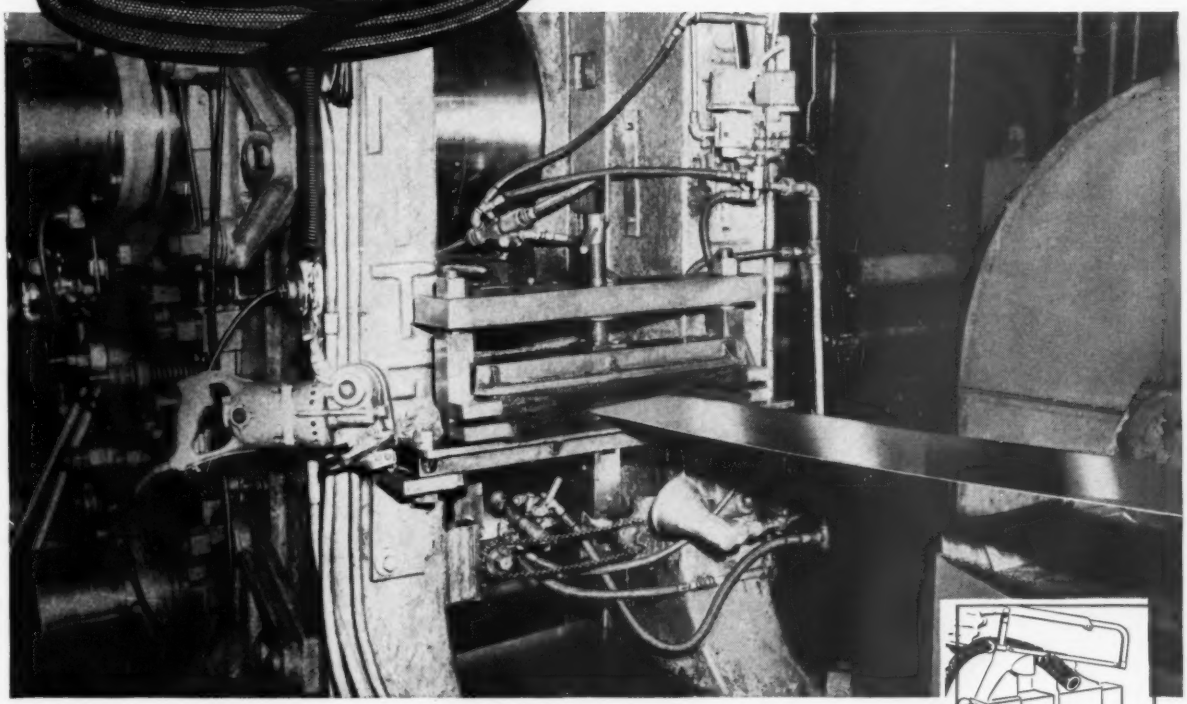
In this pronouncement we feel that Dr. Klopsteg has made a major contribution to the cause of basic research. Individuals and corporations, rather than the government, should be the source of its support, and they should be able to choose the avenue through which their research contributions should be spent.

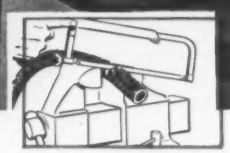
"Bulk Hose Method Has Cut Our Inventory"

"AEROQUIP IS BETTER"

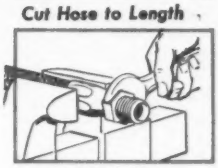
says Peter Wallace, Maintenance Superintendent,

WALLINGFORD STEEL COMPANY





Cut Hose to Length



Attach Fittings

Assembly is Ready

Wallingford Steel Company, Wallingford, Connecticut, operating the largest steel rolling mill in New England, is constantly on the alert for improved plant methods. Even the matter of replacing damaged hose lines is accomplished most efficiently . . . with Aeroquip hose lines made from bulk stock.

Peter Wallace, Maintenance Superintendent, says: "Aeroquip is better because of quick installation. It stands continuous abuse and increases safety. By stocking several sizes of bulk hose and reusable fittings, I'm able to cut the correct length of hose needed and make a replacement in just a few minutes."

Put this cost-cutting, time-saving "Aeroquip Idea" to work in your plant. See your distributor or write us for information.

See Aeroquip products on display, Booth No. 544, at the Plant Maintenance and Engineering Show, January 24-27, International Amphitheatre, Chicago.

REG. TRADE MARK

Aeroquip

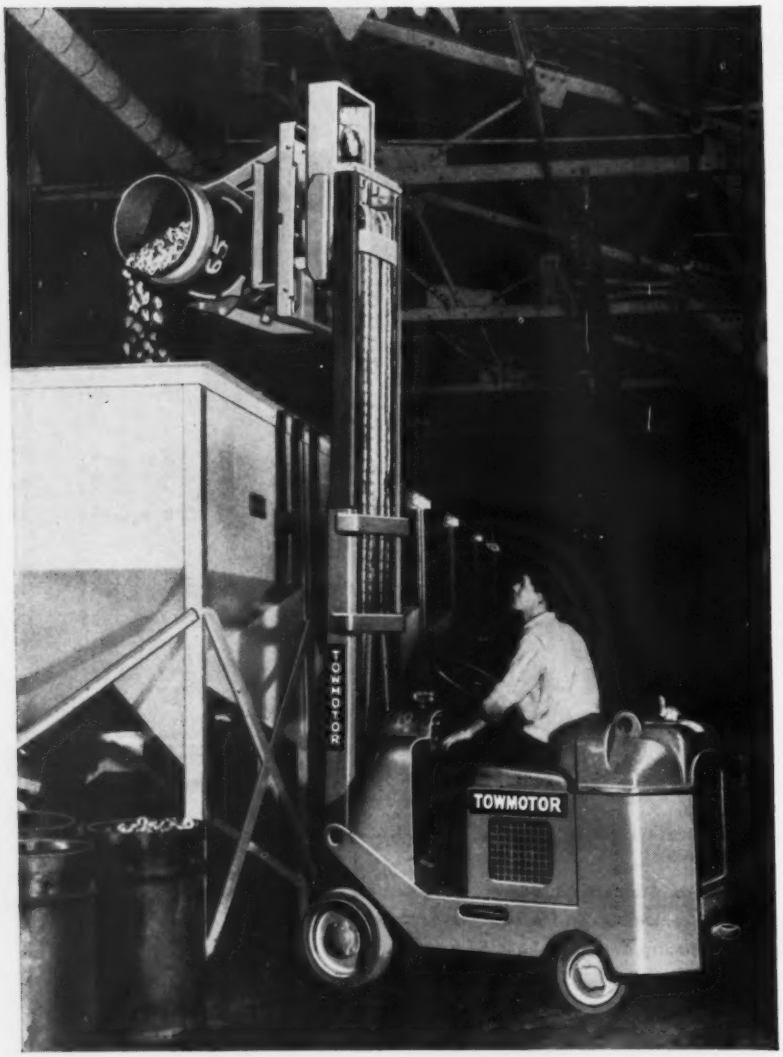
AERO-COUPLING CORPORATION

(A Subsidiary Of Aeroquip Corporation)

3015 Winona Avenue, Burbank, Calif.

SALES OFFICE and WAREHOUSE for OREGON, WASHINGTON and IDAHO: } **SPARKS-WILLS, INC., 1624 S. E. GRAND AVE., PORTLAND 14, ORE.**

TOWMOTOR
THE ONE-MAN-GANG
FORK LIFT TRUCKS
at Columbia Malleable Castings Corporation



300% PRODUCTION INCREASE

. . . Overall Handling Costs Cut 60%

Job-Planned Towmotors now pour finished parts into hoppers using a Revolving Barrel Grab. Parts feed down to a weighing conveyor and are bagged mechanically for shipment. Manual filling was eliminated and output per man increased 300%. Overall, Towmotor cut handling costs 60%.

Towmotor equipment does wonders in every plant where handling is a problem. For more information write for Job Studies covering your industry, your competition. TOWMOTOR CORPORATION, Div. 6701, 1226 East 152nd Street, Cleveland 10, Ohio.

FOR FAST ACTION—See a Material Handling Specialist—your nearby Towmotor Representative. His factory training will show you the quickest way to attain maximum handling efficiency at minimum cost.

CALENDAR OF MEETINGS

JAN. 24-27—*American Management Assoc.*, general management conference, Hotel Statler, Los Angeles. Contact AMA headquarters, 330 W. 42nd St., New York 36.

JAN. 27-28—*Fruit and Vegetable Sample Cutting for Canners League of California*, Fairmont Hotel, San Francisco. Contact M. A. Clevenger, 215 Market St., San Francisco.

JAN. 28—FEB. 1—*Industrial Engineering Institute* (7th annual), University of California, Berkeley and Los Angeles. Contact Dept. of Conferences and Special Activities, University Extension, Berkeley 4 or Los Angeles 24, Calif.

FEB. 3-4—*California Industrial Safety Conference*, Biltmore Hotel, Los Angeles.

FEB. 3-4—*Western Frozen Foods Processors Assoc.* convention, Hotel Senator, Sacramento, Calif.

FEB. 3-5—*Colorado Mining Assoc.*, annual meeting, Denver. Contact Robert S. Palmer, executive vice presideni, 204 State Office Bldg., Denver.

FEB. 7-8—*California-Nevada Manufacturers of Carbonated Beverages*, regional convention, Biltmore Hotel, Los Angeles. Contact Convention Bureau, Los Angeles Chamber of Commerce, 1151 S. Broadway, Los Angeles.

FEB. 8-10—*Society of the Plastics Industry*, Reinforced Plastics Division, Statler Hotel, Los Angeles. Contact Samuel S. Oleesky, Micronics, Inc., 1614 W. 134th St., Gardena, Calif.

FEB. 9-12—*National Tool and Die Manufacturers Assoc.*, national convention, Ambassador Hotel, Los Angeles. Contact Convention Bureau, Los Angeles Chamber of Commerce, 1151 S. Broadway, Los Angeles.

FEB. 14-15—*Vertical Turbine Pump Assoc.*, Hotel Mark Hopkins, San Francisco. Contact H. DeVoe Rea, executive manager, 453 S. Spring St., Los Angeles.

FEB. 15-18—*Western States Meat Packers Assoc., Inc.*, regional convention, Palace Hotel, San Francisco. Contact E. F. Forbes, President and General Manager, 604 Mission St., San Francisco 5.

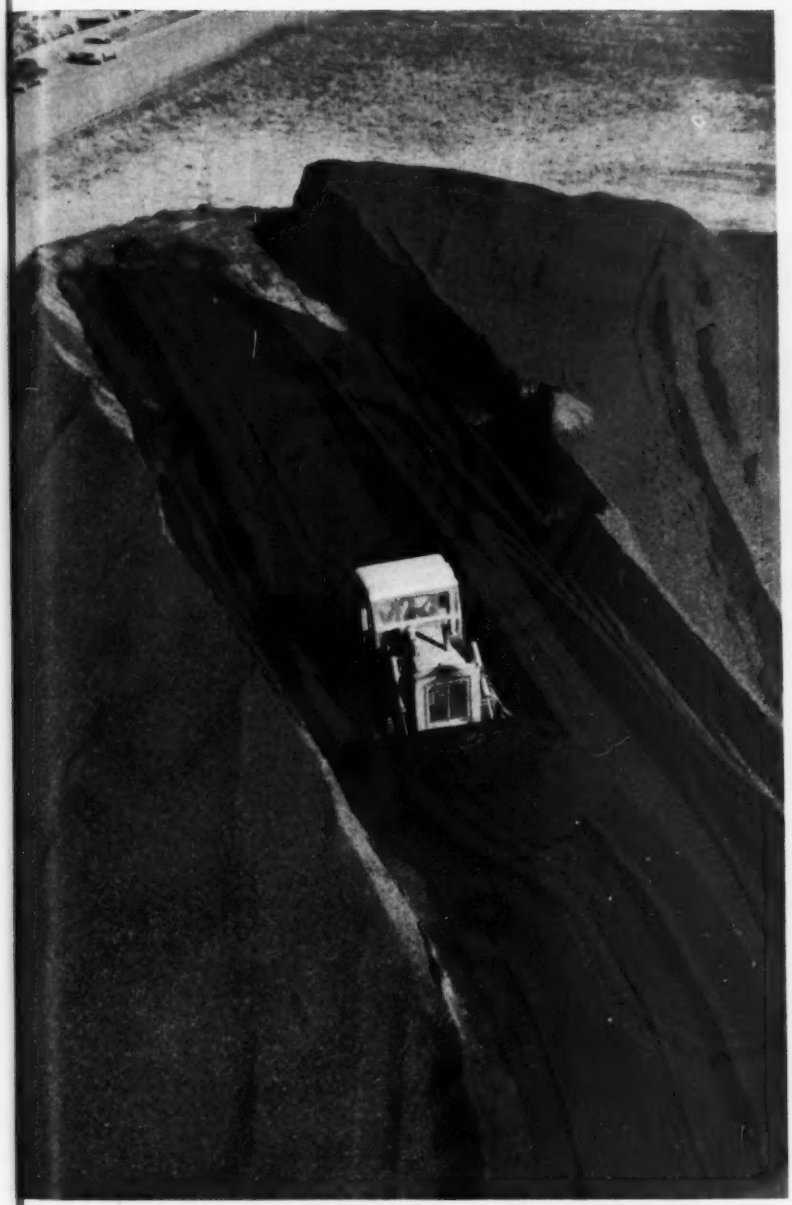
FEB. 16-17—*Second Institute on Industrial Plant Design*, Riviera Country Club, Los Angeles. Contact F .B. Cole, Los Angeles Chamber of Commerce.

FEB. 24-25—*Western Candy Conference*, Ambassador Hotel, Los Angeles. Contact Convention Bureau, Los Angeles Chamber of Commerce, 1151 S. Broadway, Los Angeles.

FEB. 28-MAR. 4—*American Bottlers of Carbonated Beverages*, beverage production meeting, Bellevue Hotel, San Francisco. Contact Harry Korab, Technical Service Director, 1128 16th St. N.W., Washington 6, D. C.

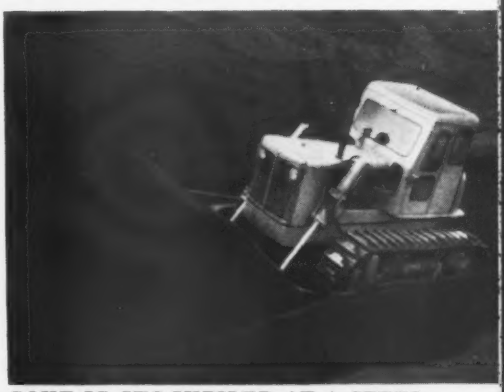
. . . MORE ON PAGE 32

MODERN METHODS of Coal Handling



COAL IS RECLAIMED AS NEEDED from the storage pile of a Michigan industrial plant by this Allis-Chalmers 109 drawbar hp HD-15 Tractor with Gar Wood straight blade and wings. It moves about 9 tons of coal at a time. Unit also stores coal, which is brought in by rail. Tractor handling of coal is flexible, can either supplement existing facilities or take over complete job. Permits adding storage areas without installing costly conveyors, tracks, etc. — or abandoning them without leaving money tied up in idle equipment.

14 TONS OF COAL AT A TIME is stockpiled or reclaimed at an Eastern utility by this HD-20 Tractor with special Baker coal blade. Blade design takes advantage of tractor's big 175 net engine hp, permits moving up to 15 percent more coal than with regular blade. Repeated trips of 25-ton unit over stockpile compacts coal, helps prevent spontaneous combustion.



COKE IS STOCKPILED AT A STEEL MILL leveled and compacted by this Allis-Chalmers 72 drawbar hp HD-9 Tractor — then is reclaimed as needed for the plant. Wintertime operation no longer is hindered by freezing of coke surface as it was with system previously used.

VERSATILE HD-9G WITH 3¾-YD. (2.8-TON) BUCKET builds storage pile of coal brought to Midwest industrial plant by truck. These coal-handling buckets are available for all four Allis-Chalmers tractors, from 2-yd capacity on the HD-5G to 7-yd on the HD-20G. Blades and other attachments are interchangeable with buckets to widen the usefulness of Tractor Shovels.

Find out more about how Allis-Chalmers equipment can improve your coal handling at lower cost. See your Allis-Chalmers dealer for a demonstration right at your plant, or ask to see the color film showing coal-handling equipment at work. Also, send for free booklet, "Economic Coal Storage."

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

WISCONSIN
HEAVY DUTY
Air-Cooled ENGINES
REG. U.S. PAT. OFF.

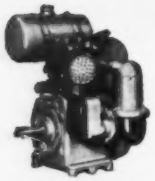
Identify Your Equipment with this Significant Symbol of
POWER PERFORMANCE and LONG ENGINE LIFE

If you are a manufacturer of engine-driven equipment of any kind, you stake the reputation of your company on the PERFORMANCE of the Power Component. The saleability, acceptance and customer endorsement of the equipment itself logically hinges upon the quality of the service it delivers. When the *power* fails, the *equipment* fails.

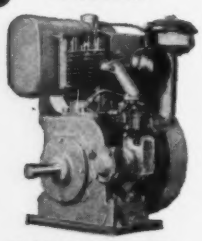
The significance of the Wisconsin Heavy-Duty Air-Cooled Engine "MOST H. P. HOURS" trade-mark is important to you because it states a fact that is vitally important to the customer-user. It represents a positive sales asset both to the equipment manufacturer, his distributors and dealers . . . *because it means what it says!* It's a symbol of dependability, low cost maintenance and long engine life.

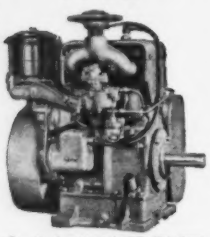
Field service records in many types of operations . . . in the construction field; in farm service; on oil field, material handling, truck refrigeration, mining and quarrying equipment . . . show that wherever rugged operating conditions are encountered, Wisconsin Engines are proving their case every day, in all climates.

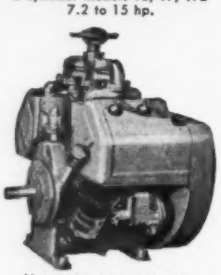
Our Engineering Department will be glad to co-operate with your design engineers in adapting Wisconsin Engines to your specific requirements. Don't overlook the potentials of this "Plus Value" as standard, specified power for *your* equipment.

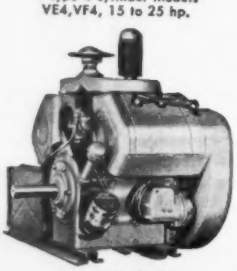

Models ABN, AKN
3 to 6 hp.

Model AEN
4.5 to 8.25 hp.


Models AFH, AGH, AHH
6 to 9.2 hp.


2-cylinder Models TE, TF, TFD
7.2 to 15 hp.


V-type 4-cylinder Models
VE4,VF4, 15 to 25 hp.


V-type 4-cylinder
Model VG4D, 25 to 36 hp.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

A 8238-¾

CALENDAR

. . . Begins on page 30.

MAR. 1-3—*Joint Western Computer Conference and Exhibit*, Statler Hotel, Los Angeles. Contact William Gunning, conference secretary, International Telemeter Corp., 2000 Stoner Ave., Los Angeles 25.

MAR. 2-5—*Western Pine Assn.*, regional meeting, San Francisco. Contact S. V. Fullaway, Jr., executive secretary, Yeon Bldg., Portland, Ore.

MAR. 9-11—*National Assoc. of Engine and Boat Manufacturers*, Fairmont Hotel and St. Francis Yacht Club, San Francisco. Contact Thos. R. Rooney, Pacific Coast Representative, 369 Pine St., San Francisco.

MAR. 10-11—*Porcelain Enamel Institute*, Pacific Coast conference, Biltmore Hotel, Los Angeles. Contact Institute headquarters, DuPont Circle Bldg., Washington, D. C.

MAR. 14-18—*American Society of Tool Engineers*, industrial exposition and annual meeting, Shrine Auditorium and Shrine Exposition Hall, Los Angeles. Contact H. E. Conrad, executive secretary of ASTE, 10700 Puritan Ave., Detroit 38, Mich.

MAR. 18-19—*Arizona Industrial Development Conference*, University of Arizona, Tucson. Contact Dr. L. W. Casaday, Director, Bureau of Business Research, University of Arizona.

MAR. 25-26—*American Foundrymen's Society*, Calif. regional meeting, Huntington Hotel, Pasadena. Contact Wm. C. Baud, Food Machinery and Chemical Corp., 4545 Pacific Blvd., Los Angeles.

MAR. 25-27—*Western International Assoc. Refrigeration Service Engineers Society*, Tacoma, Wash. Contact Tacoma Chamber of Commerce.

MAR. 28-APR. 1—*Western Metal Congress and Western Metal Exposition*, Pan-Pacific Auditorium, Los Angeles. Contact W. H. Eisenman, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

APR. 5-7—*Electrical Maintenance Engineers Assoc. of Southern California* conference, University of Southern California, Los Angeles. Contact Association office, 1052 West Sixth St., Los Angeles 17. MU 1734.

APR. 6-10—*World Plastics Fair and Trade Exposition*, National Guard Armory, Exposition Park, Los Angeles.

APR. 13-15—*Society of the Plastics Industry*, Pacific Coast Section conference, Palm Springs, Calif.

APR. 18-19—*National Air Pollution Symposium*, Huntington-Sheraton Hotel, Pasadena, Calif.

APR. 19-20—*33d Pacific Coast Management Conference*, Claremont Hotel, Berkeley, Calif. Contact Everett Van Every, President, California Personnel Management Assoc., 2180 Milvia St., Berkeley 4, Calif.

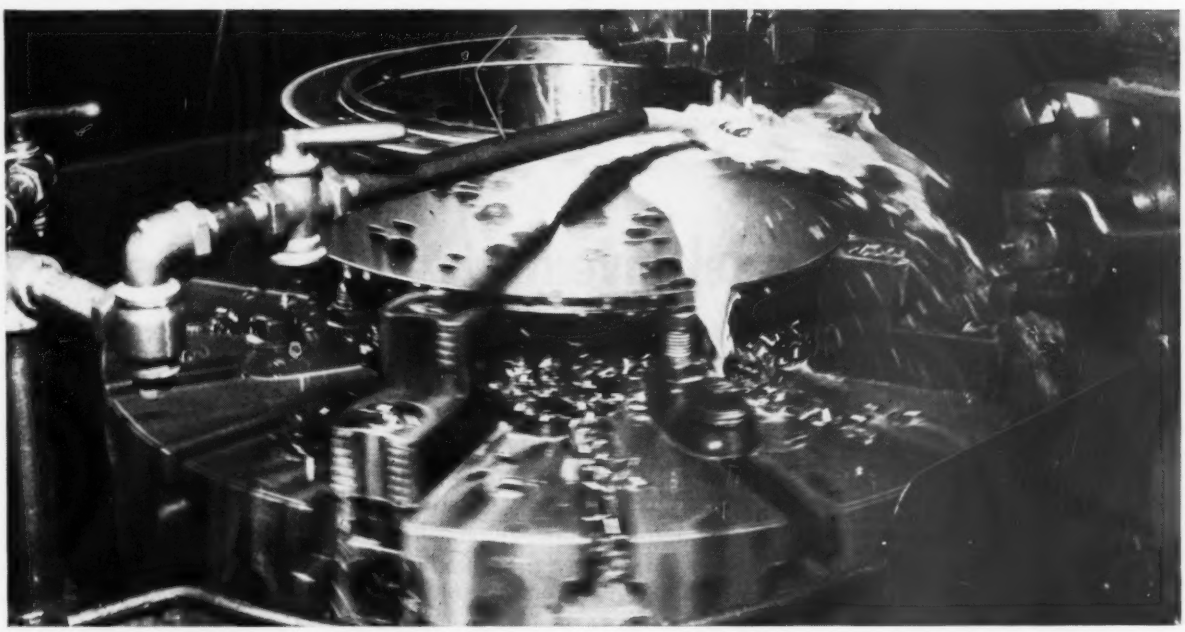
MAY 11-13—*Pacific Coast Electrical Assoc.*, regional convention, Palace Hotel, San Francisco. Contact Victor Hartley, Executive Secretary, 50 West 16th St., Los Angeles 14.

MAY 26-27—*Electronic Components Conference*, Los Angeles. Contact Dr. Simon Ramo, Ramo-Woldridge Co., 8820 Bellance Ave., Los Angeles 45.

Standard Engineer's Field Report

CASE HISTORY
LUBRICANT Calol Cutting Fluids
FIRM California Press Mfg. Co., San Francisco, Calif.

Low-cost cutting fluid solution stops rust, rancidity for pellet-machine manufacturer!



IN MACHINING HEAVY FORGINGS, like this, California Press Manufacturing Co., San Francisco, uses a one to 20 solution of Calol Soluble Oil and water. This light solution efficiently lubricates and cools carbide-tipped tools and work on this 36" vertical turret lathe as well as other machines in the plant. Over a ten-year period, this firm tried numerous competitive products, some costing three times as much, but Calol Soluble Oil is the only one they found which does not turn rancid, separate in storage or let work rust. They use Calol Cutting Fluids in all of their 46 different machine tools.

CALOL

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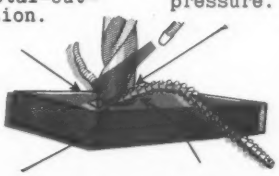
FREE CATALOG "How to Save Money on Equipment Operation," will be sent on request to Standard Oil Company of California, 225 Bush Street, San Francisco, California.

FOR EXPERT HELP on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative, or write to 225 Bush Street, San Francisco, California.

Why Calol Cutting Fluids solve metal-cutting problems

Specialized products for every metal-cutting operation.

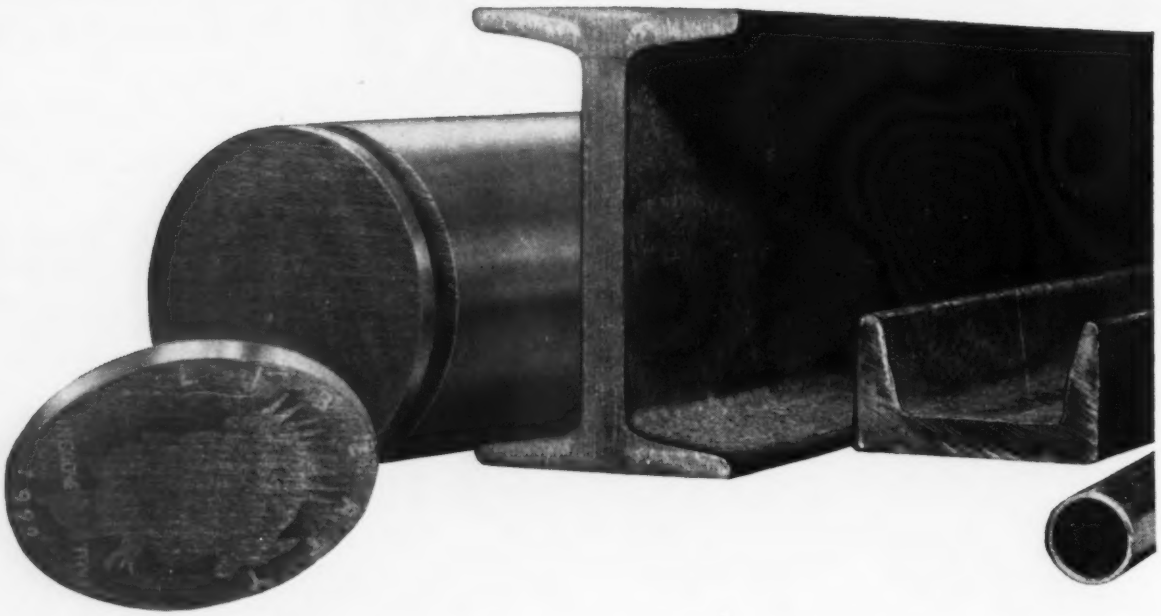
Additives resist rusting, corrosion, pressure.



Flush away cuttings readily.

High cooling and lubricating qualities. Very stable.

STANDARD OIL COMPANY OF CALIFORNIA



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You might be shocked to find how fast the hidden costs of carrying steel inventories add up! We know because steel inventories have been our stock in trade for over a hundred years.

But you don't *have* to tie up plant space and capital in steel you won't use for many weeks—may never use if products or markets change quickly. You don't *have* to lay out cash for cutting and handling equipment, incur unnecessary scrap loss, or divert manpower to unproductive inventory work.

Instead, you can hold your own inventories to a practical minimum and draw on Ryerson inventories as current requirements arise. At Ryerson you have the world's largest stocks at your disposal—plus unequalled facilities for preparing steel to your order—so you can get delivery of any kind of steel in practically any quantity, within a few hours.

That's why we urge you to consider *all* your costs when setting inventory policy. And let Ryerson help you release more of the money in steel inventories for profit-producing opportunities. Our inventory experience is at your service.

RYERSON STEEL

Principal products in stock: bars, structurals, plates, sheets, tubing, alloy and stainless steel, reinforcing steel, etc., also machinery and tools

RYERSON CERTIFIED STEELS

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SAN FRANCISCO—Plant: 65th & Hollis Sts., Emeryville. Mail: Box 188, Emeryville, California. Phones: OLympic 3-2933, ENterprise 1-0176.
SEATTLE—Plant: 1200 - 4th Ave. Mail: Box 3268, Seattle 14. Phone: SEneca 2300.
SPOKANE—Plant: North 207 Freya St. Mail: Box 2158, Spokane 10. Phone: KEystone 9311.

annual **Western Outlook** number

7th Review and Forecast

JANUARY 1955

FACING THE WEST'S FUTURE

THE WEST can well start right now adjusting its sights to the West of the future, for one phase of that future is practically here now.

By ARTHUR C. PRENDERGAST
Editor, WESTERN INDUSTRY

Ten years from next July its most populous state, California, will also be the nation's most populous state—provided, of course, that the population increase from 1950 to 1954 as estimated by the Census Bureau last October continues unabated for ten years more.

And who can say for sure that it won't? The 1950 census, with its startling revelation of a postwar growth matching the World War II surge, was a jolt to countless skeptics, but even the 1940-1950 decade was only a continuation of a long-established upward population curve for the West.

Some Western industrial leaders, as revealed in the opinion survey a few pages further along, think the Westward migration will slow down, but others feel it will accelerate.

California's prospective margin over New York in 1965, according to the projection of census estimates on which this prediction is based, will only be minute—37,000. But even if

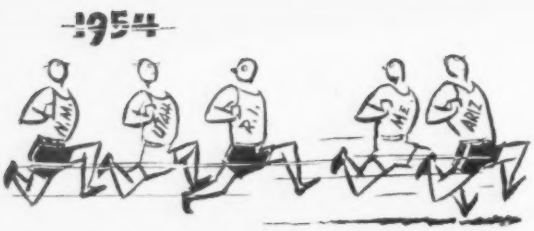
NEW YORK leads the population race today, with California ranking No. 2. BUT, 10 years hence, California will be out in front, with everybody else except New York considerably behind, if present growth ratios continue.

Here are the statistics

1950-1954 figures from Census Bureau estimates of October 25, 1954. Projections to 1965 by Western Industry.

(in thousands)

	April 1, 1950	July 1, 1954	Percent increase 1950-54	July 1, 1965
N. Y.	14,801	15,368	3.8	16,835
Calif.	10,413	12,213	17.3	16,872
Penn.	10,480	10,755	2.6	11,467
Ill.	8,672	9,106	5.0	10,228
Ohio	7,938	8,535	7.5	10,078
Tex.	7,584	8,240	8.6	9,935
Mich.	6,361	7,010	10.2	8,539



ANOTHER RACE: Arizona (with 974,000 population) is just ahead of Maine (916,000), while Utah (753,000) and New Mexico (752,000) trail little but populous Rhode Island (790,000).

BUT BY 1965 places will have shifted: both Arizona (1,574,000) and New Mexico (972,000) will lead Maine (926,000), and Utah (921,000) will show its heels to Rhode Island (831,000).

California's present population increase of 423,500 against New York's 133,400 per year falls off sharply, the overtaking could only be postponed some five years at the most.

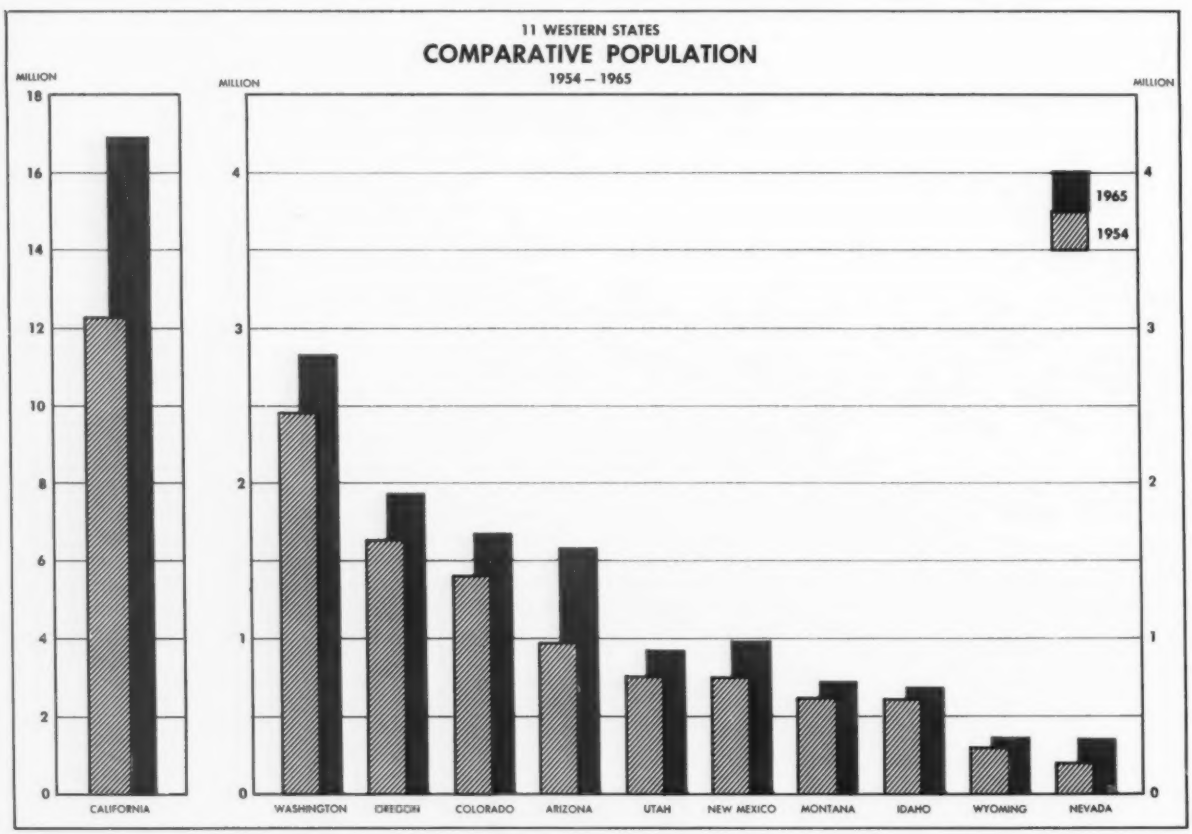
Two other Western states, Arizona and Nevada, actually are exceeding California's rate of growth, percentagewise, while a third, New Mexico, is not far behind.

The fact that the greatest population growth is being experienced in the southern belt of the eleven Western states seems to prove that the dominating economic force in the West today is not economic, but social. In other words, the desire for a freer physical and mental climate is uppermost, and the warmer areas with their opportunity for more outdoor living have been the immediate magnet.

Not that the other states in the West are less desirable—what can match the beauty of Olympia or the quiet charm of Boise, for example, but apparently they have not yet awakened to the need for talking up their areas as delightful homelands.

Projecting the West's development, covering a period of 15 to 20 years or so, a special study made in November 1954 by Stanford Research Institute, for a California industry, shows the eleven Western states as having 26,000,000 people by 1960, a gain of 5,500,000 from 1950, and by 1975 a population of 36,750,000, or over 17% of the inhabitants of the United States. This would mean a gain of 40% in 15 years.

Another factor in measuring the West's economic development in this



1950-1954 figures from Census Bureau estimates of October 25, 1954. Projections to 1965 by Western Industry. (Figures in thousands.)

	1950	1954	% increase	1965		1950	1954	% increase	1965		1950	1954	% increase	1965
Calif.	10,413	12,213	17.3	16,871	Ariz.	742	974	31.3	1,574	Ida.	588	611	3.9	670
Wash.	2,317	2,459	6.1	2,826	Utah	687	753	9.5	921	Wyo.	282	302	7.2	354
Ore.	1,519	1,634	7.6	1,934	N. M.	668	752	12.7	972	Nev.	157	209	33.1	343
Colo.	1,307	1,408	7.7	1,669	Mont.	589	624	5.9	714	Total West	19,269	21,940	13.9	28,553

study is the amount of disposable income payments to individuals. The accompanying chart reflects an increase in real disposable income from $32 billion to $60 billion between 1950 and 1975, assuming the value of the dollar remains at the 1952 level. This enormous increase speaks for itself.

The prospective activity in plant and equipment expenditures is similarly shown, rising from $2.63 billion in 1950 to over $4 billion in 1960 and reaching $6 billion by 1975.

By common acceptance, new construction expenditures are looked upon as a prime indicator of a healthy, growing economy. In 1950 the West's $6 billion constituted 18.6% of the nation's total.

SRI expects that by 1960 the West will be spending at the rate of $6.5 billion annually and by 1975 over $9 billion, or more than 20% of the nation's total. All these figures are in 1952 dollars, without provision for inflationary forces. The enormity of dollar volume represented by these percentage increases can be realized, and there is informed opinion which holds that as estimates they may be very low.

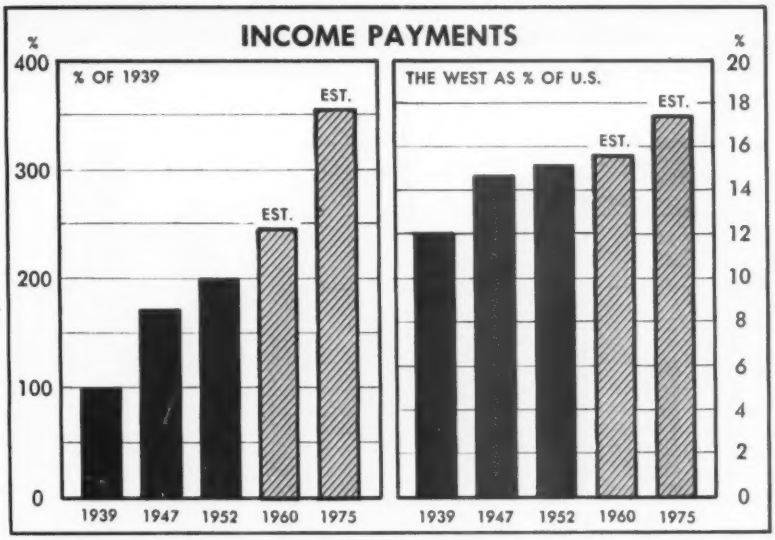
Using non-residential construction as a more specific gage of industrial growth, the SRI estimate is $3.5 billion by 1960 and almost $5 billion by 1975. Here again these figures may be conservative.

Estimates conservative

If by this time data and conclusions seem to be on the optimistic side, let the record show that in comparison to well documented forecasts by other thoroughly qualified economists, the above figures are truly conservative. Significant developments already under way may prove the foregoing forecasts to have been timid.

There is ground, for example, to support an estimate of a $50 billion U. S. annual construction bill by 1960 as compared with $33 billion in 1953 and of $10 billion for the Western states. In these figures allowances have been made for such impelling forces as the vast expansion of the electric power industry, a comprehensive road and highway construction program, the engineered renaissance of our cities, and the continued growth of their suburbs.

General Electric Company officials recently presented to a conference of electric utility executives the results of an extensive economic study made to assist the industry in long range planning. A projection of the economy into 1964 was the foundation for



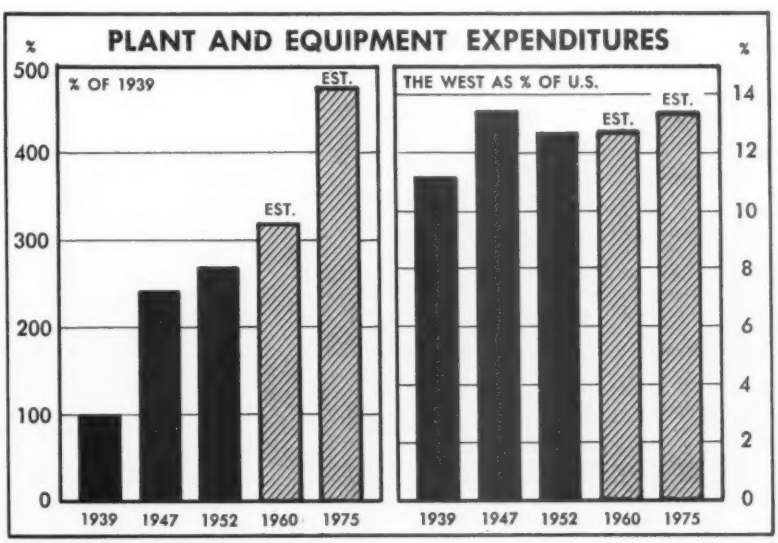
Total annual income payments to individuals, in millions of dollars

(Past figures: U. S. Dept. of Commerce. Future estimates: Stanford Research Institute)

	1939	1947	1952	Estimated 1960	Estimated 1975
Percentage of 1939	100.0	171.2	200.6	247.1	357.1
The West as % of U.S.	12.1	14.7	15.2	15.7	17.5

Year	Ariz.	Calif.	Colo.	Year	Idaho	Mont.	Nev.	N.M.
1950	931	18,621	1,840	1950	742	928	303	775
1953	1,370	24,856	2,367	1953	851	1,037	448	1,021

Year	Ore.	Utah	Wash.	Wyo.	Year	Total West	Total U.S.
1950	2,321	880	3,875	439	1950	31,655	217,828
1953	2,762	1,108	4,663	505	1953	40,988	270,577



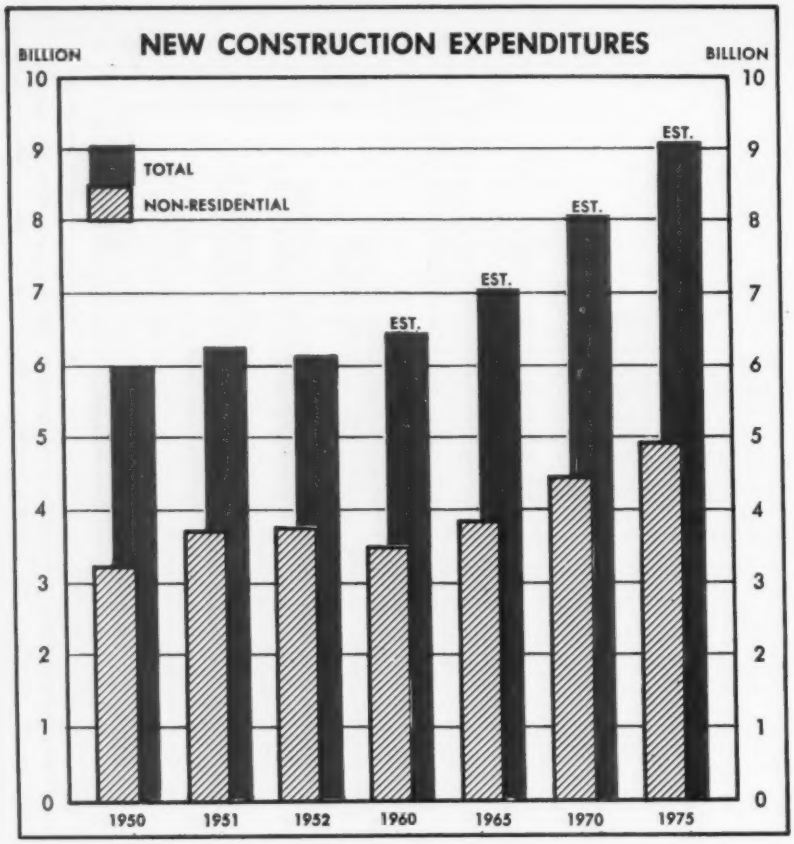
Total plant and equipment expenditures

	1939	1947	1952	Estimated 1960	Estimated 1975
Percentage of 1939	100.0	241.12	269.2	320.8	478.4
The West as % of U.S.	11.2	13.5	12.7	12.8	13.4

Estimates for 1950-1975, in millions of 1952 dollars

(Stanford Research Institute)

Year	11 Western States	Total U.S.	West as % of U.S.	Year	11 Western States	Total U.S.	West as % of U.S.
1950	2,630	20,435	12.9	1965	4,600	35,400	13.0
1953	3,490	27,690	12.6	1970	5,290	40,100	13.2
1960	4,010	31,350	12.8	1975	5,980	44,610	13.4



New construction expenditures

Total and non-residential
(in millions of 1952 dollars)
Past figures: U.S. Department of Commerce. Estimates: Stanford Research Institute.

	Mountain	Pacific	Total West
1950			
Non-residential	1,026	2,210	3,236
Total	1,535	4,463	5,998
1951			
Non-residential	1,094	2,670	3,765
Total	1,483	4,742	6,225
1952			
Non-residential	1,068	2,721	3,789
Total	1,457	4,645	6,102
1960			
Non-residential	980	2,530	3,510
Total	1,500	4,950	6,435
1965			
Non-residential	1,090	2,790	3,880
Total	1,600	5,400	7,000
1970			
Non-residential	1,230	3,240	4,470
Total	1,800	6,200	8,000
1975			
Non-residential	1,370	3,590	4,960
Total	2,050	7,000	9,050

more specific forecasts primarily of interest to power men.

In the course of evolving this projection, GE economists predicted a 37% increase in the gross national product in the next ten years to $490 billion. This fits closely with President Eisenhower's reference in a speech on October 25 to a $500 billion economy ten years hence. Both figures are somewhat higher than those used by Stanford Research Institute. General Electric looks for an 8% annual increase in power load, which would more than double the use of electric power by 1964.

General Electric's predictions of U. S. population increase are close to those of the Stanford researchers, but GE's anticipation of the 1964 disposable income is considerably higher—$350 billion in 1964 (SRI looks for $298 billion by 1965)—which may reflect some difference in method.

The net over-all comparison, however, is a reaffirmation of the conservative nature of the forecasts used by SRI (and may we add, of WESTERN INDUSTRY's projection of the Census Bureau's population estimates).

Immediate picture

The California outlook, according to Herbert F. Ormsby, research director of the California State Chamber of Commerce, "appears to be for relative stability at high levels of activity already reached, rather than for any large expansion above the levels prevailing at the end of 1954."

California's employment decline in 1954 from 1953, estimated by the State Division of Labor Statistics, was less than the national, as follows, in percentage:

	Calif.	U.S.
Total non-farm	—1	—3
Factory	—2.3	—7

Although major truck lines complain of a falling off in tonnage, the state border crossings seem to be up.

	California	Arizona
	No. of trucks entering state	Commercial vehicles checked through ports of entry (busses excluded)
1950	226,851	341,342
1951	272,691	437,674
1952	266,977	587,992
1953	274,939	659,158
1954	297,714	596,721*

* Ten months.

Although industrial plant expansion showed a decline in 1954 from 1953, residential construction apparently surpassed 1953 and approached the record year of 1950.

New factories and plant expansions as reported by California State Chamber of Commerce and the Portland Chamber of Commerce (in thousands of dollars) are:

Year	Northern California	Southern California	State total
1951	$179,525	$359,839	$539,364
1952	204,971	421,810	626,781
1953	271,502	239,976	511,278
1954 (est.)			400,000
Average, 1946-1950			250,000

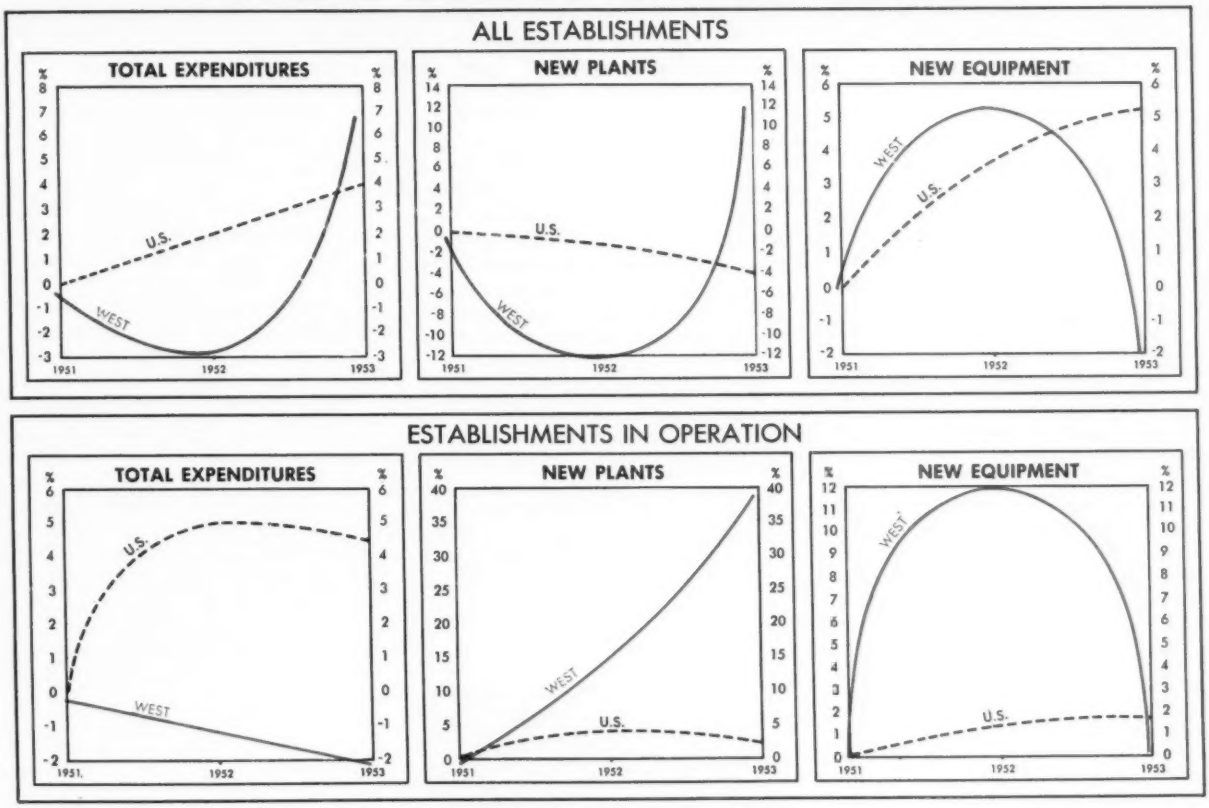
Portland area

1953 . . . $15,000 1954 . . . $21,000

Built solidly into Pacific Coast economy for some years to come at least, in view of the nation's military preparedness program, is the aircraft industry, with its related missile and electronic equipment. Much of the expansion since 1950 has been due to this, and is largely responsible for factory payrolls and value added by manufacture more than doubling since 1950 in California.

At the same time, manufacturing of all kinds is increasing, as the addition of new and enlarged manufacturing plants to the Western economy shows. While the 1954 figures are less than 1953, the industrial base becomes

MANUFACTURERS' EXPENDITURES FOR NEW PLANT AND EQUIPMENT



Manufacturers' expenditures, all establishments (including plants under construction) from Census Bureau, Survey of Manufactures (in thousands of dollars)

	Total expenditures			New structures and additions to plant			New machinery and equipment		
	1951	1952	1953	1951	1952	1953	1951	1952	1953
Mountain	123,777	126,649	122,340	51,178	29,556	39,916	72,599	97,093	82,424
Pacific	706,132	682,956	750,772	250,662	224,837	315,601	455,470	458,119	435,171
Total West	829,909	809,605	873,112	301,840	254,393	355,517	528,069	555,212	517,595
Montana	s	10,958	31,881	s	3,598	15,388	s	7,360	16,493
Idaho	16,731	24,861	16,818	3,385	4,198	6,514	13,346	20,663	10,304
Wyoming	12,328	15,142	14,423	3,530	1,978	5,777	8,798	13,164	8,646
Colorado	31,481	34,183	26,583	11,859	8,469	3,467	19,622	25,714	23,116
New Mexico	5,060	4,773	3,932	s	1,103	1,201	s	3,670	2,731
Arizona	9,483	11,193	7,199	s	2,558	2,421	s	8,635	4,778
Utah	25,057	17,076	15,009	11,724	4,702	3,070	13,333	12,374	11,939
Nevada	1,774	1,445	4,794	s	s	1,373	s	s	3,401
Washington	100,826	144,892	125,083	26,871	43,004	49,302	73,955	101,888	75,781
Oregon	111,550	80,154	63,377	30,053	17,764	17,736	81,497	62,390	45,641
California	493,756	457,910	562,312	193,738	164,069	248,563	300,018	293,841	313,749

s Withheld because estimate did not meet publication standards.

wider with each succeeding year.

Perhaps less account is taken of the pools of scientific knowledge and technical trained manpower, both in the engineering and craftsman levels than of other factors in the West's advancement. To WESTERN INDUSTRY it is probably the most important resource the West has. Around the aircraft factories are to be found small shops staffed by men skilled far beyond the level of older industries, and the West's various AEC installations are breeding grounds not merely for plutonium and reactors, but for scientific knowledge in the minds of men looking for new opportunities for themselves.

The uranium development on the Colorado Plateau is a striking and significant example of a new industry born overnight but contributing an important new element in the West's economy. As the ore is mined in increasing quantities, processing mills spring up, and strikingly enough become obsolete practically as fast as they are completed.

Although the bamboo curtain across the Pacific makes the hopes for that area becoming a market for Western products in the near future merely wishful thinking, Alaska and Lower California offer new possibilities. Aluminum production in southeastern Alaska is already a reality and pulp mills for Alaska are a second big factor for the immediate future. Not so much has been heard about Lower California, but there are indications of a new economy ahead for that area which would particularly benefit San Diego.

Still closer links with Canada are ahead, with oil and gas to cross the border, and perhaps hydro power.

Views on the West's future

Twenty leading industrialists give "off the record" opinions

"Roadblock removed"

With ample supplies of energy guaranteed by several alternative oil sources in addition to California and foreign fields, industrial expansion has removed one of the roadblocks to the future development of great natural resources in this area.

The economy of 1955 is free to grow on a sound and normal base, aided by a huge backlog of schools, hospitals, highways, and other installations needed by the present population. Also, industry will turn its attention from volumetric expansion to modernization for cost reduction or cost control. These needs are sufficient to carry the economy through 1955 at the present high levels.

The pattern of modern life is undergoing a dynamic change, with decentralization and relocation of industries and clerical staffs as well as families to find pleasant surroundings and less time consumed in traveling. The management of leisure time also provides new motivation for living patterns.

Although the natural rate of population growth will slow down in proportion to the low birth rate of the depression, the rate of migration from other areas will not decline. Experience has shown that if times are good throughout the United States, people migrate to the Far West by choice, while if times are bad elsewhere, people migrate to areas of climatic advantage.

"Significant trends"

(a) The great expansion of ore mining in the Intermountain states; rapid growth of the chemical and electronic industries; continued maximum operation of the aircraft industry, supplemented by its entry into the field of guided missiles; continued expansion of the aluminum industry in the Pacific Northwest; continued building of dams in that area for power and irrigation.

(b) Increasing awareness of national manufacturers in the East and Middle West that high transportation costs and satisfactory delivery and service require their locating plants here to satisfy the Western market, notably true in the automotive and automotive components industries.

(c) Increasing appreciation by Eastern and Midwestern manufacturers that there are many small but well-established local industrial firms available for purchase and expansion. In many instances this has been partly inspired by desire for diversification of products as well as decentralization of operations.

Western population will continue to grow faster than the rest of the country, although not at the constantly accelerating rate of the immediate post-war years. "Nothing succeeds like success" and the Far Western states are now generally recognized as being extraordinarily successful. People of all ages, particularly the young, are attracted by the promise of jobs, climate, good living conditions, etc.

"Wider personal life"

One of the healthiest and most significant industrial trends in the West is the widespread diversification within local areas and the state as a whole.

The cycle is interesting in that new industries are created to serve increased population and in the process of being created develop even more population for another industry to serve, etc. One of the most significant developments is the change from a warehouse assembly type of unit in the West to a full-fledged manufacturing unit.

Our growth in population is primarily due to the pull that has existed for many years—the opportunity for a wider personal life and greater opportunities in a new country and new business connections.

There are many significant trends, including the expansion of research, development, super highways, etc., but all these things develop from the attitude of the people in the community.

Growth will remain at the same accelerated level unless some of the problems created thereby become too oppressive and too complex, such as high wages, too much dependence on the military dollar, smog, traffic, schools, hospitals, recreation.

"Autos soon"

For the last year we have maintained business at higher levels than our Eastern and Midwestern counterparts. Our 1955 increase over 1954 will be greater than theirs, and for the next five years there will be some decided changes, most of them for the better.

I base the above on three outstanding trends: (1) more manufacturing and less warehousing by Eastern firms; (2) less merchandising through sales agencies, more direct selling by branch offices and plants; (3) recognition and lack of fear of Eastern competition in manufacturing by adoption of up-to-date methods. This trend has slowly taken foothold the past few years and is gaining momentum. Due to this, larger firms for manufacturing and distribution will come into being, founded by Western money and personnel. This will overcome the controversial stepchild plant of Eastern origin.

Undoubtedly the population will accelerate to keep pace with all the added output of petroleum products, farm produce, mining, electronic devices, aircraft, and motor vehicles. Both the aircraft and automobile industries will produce more and more component parts in the West. Sometime between now and 1965 automobiles on the standard passenger models will be manufactured (not assembled) in the Los Angeles district just as completely as in Detroit. This also applies to aircraft engines. We build the frames and assemblies, why not the power plants?

"More soft goods"

The three most outstanding industrial trends in the West are the great gains in the metal and chemical industries and the falling off of the logging industry. This trend will continue with probably a build-up of smaller industries in soft goods, although the latter will not become a major product in the West.

As long as the large industrial plants can find sites and water they will continue to come to the West, and the population will follow these plants here as long as there are opportunities for jobs.

"Population will snowball"

In 1955 industrial expansion will continue; not only will present companies grow, but new lines of manufacturing will be added. This will also hold good for the next five years.

Western population will accelerate, first, because the influx of people from the East will continue at approximately the same rate. Second, because the greater part of the population increase of the last few years has been young people who are now in the process of having families, and this will tend to snowball the Western population and also to lower the age level.

"Research helps"

Research will continue to be most important to Western progress. Many of the Western universities—Stanford, Denver University, Colorado University, Colorado School of Mines, as well as the agricultural colleges, are performing excellent service along this line. The larger companies have their own research departments and recognize that new developments must be based on accurate facts.

Steel is important to a growing region and will continue to be needed in large quantities. Aluminum has shown excellent progress, and new and wider uses for it are being found. Western railroads have done an outstanding job in modernizing their lines to keep pace with Western progress. Construction in the West is an outstanding story, and larger roadbuilding projects will spark the entire construction program next year.

"More know-how"

Four out of five notable events of the past year (exploiting more fully sites for hydraulic power, extending natural gas facilities, broadening known horizons of petroleum and uranium reserves, increased interest of industry in atomic energy) are concerned with energy. (Fifth is heightening recognition of the West as a source of industrial and technical know-how).

Significantly, each of these above items is of a positive nature. This means that with optimism concerning new reserves of energy in the West, there will be greater encouragement to industry to move to the West or extend its activities in the West. Long range aspects of this are inherent in the interest industry has evinced in atomic energy, through the establishment of groups of industrial and utility companies of the West to study technical and economic problems involved in the generation of electricity from uranium. It softens somewhat the skepticism with which industry has viewed Western energy sources, which have been to a large extent dependent on hydraulic sites.

Heightened recognition of the West as a source of industrial and technical know-how has been particularly evident at such spots as the National Reactor Testing Station in Idaho, which in the last year has attracted constantly increasing numbers of technical groups of national scale.

Western population growth probably will slow down, because it has passed the peak of acceleration caused by the war with its uprooting effects. Permanent migration cannot continue faster than the ability of industry to absorb it, and it would seem that this rate has been exceeded in the last few years.

"Big construction year"

The year 1955 will continue as a big year for construction; people undoubtedly will continue to arrive in California in large numbers, which means more and expanded plants.

In the next five years the Western part of the country will continue to develop, although perhaps not as fast as in the last ten, and the West will outstrip the rest of the country in population increase. This will require additional construction work in transportation and educational facilities.

"Better living conditions"

Better living conditions and recreational facilities plus high wage scale are drawing people to this area. Accelerated harvesting of timber is another trend and the start in development of potential mineral deposits will expand as additional power is available.

Our major industrial companies are establishing branch plants in the West to avoid the increasing handicap of high freight costs from the East. Additional hydro power in the Columbia River Basin will be helpful in expanding industry. Heretofore so much of this power has been diverted to aluminum reduction that it has not benefited employment to any extent.

It is not reasonable to assume that the migration of people to the West in the last ten years will continue at the same rate because it is necessary for industry to assimilate these large numbers of people with year-around employment. We have some serious employment problems in the Pacific Northwest at the present time.

"More power needed"

Northwest population growth will accelerate even more rapidly if we succeed in getting adequate low cost power, but this cannot be done without the fullest cooperation of the federal government and local public and private utilities.

If we could be assured of enough capacity, there would be less concern on the part of the utilities generally of large block loads coming into the area at the expense of normal load growth.

Adverse factors cited by industrialists

Waterfront and shipyard labor rates, controversies and work stoppages have tragically undermined a major segment of our coastal economy . . . Whenever possible, ships are repaired and built elsewhere, steamship lines discontinue West Coast services, seek safer fields.

Inadequacy of highways and highway development.

Unfavorable transportation differentials, particularly in waterborne commerce. Cost of loading and unloading ships restrictive, is a challenge to ingenuity. High freight rates and lack of market overlooked by those industries coming to the West who do not make studies during early planning stages.

Our municipalities have to both construct, as well as service, their facilities, so taxes are going to be deterringly high at local and state levels. Unemployment insurance regulations should be changed to help taxes, which are getting too high and if they continue upwards will deter industry from coming West.

Continuing threat of government control of industry. Government agencies that can hinder industry from growing by restricting it.

Adverse publicity, particularly Southern California's "greatly exaggerated" smog.

"Modest recovery"

Western business achieved in 1954 modest recovery from a relatively mild economic readjustment, largely attributable to high level of consumer disposable income, which, with accumulated savings, made possible maintenance of record levels of retail sales and residential building.

Adverse trends have lost momentum and will be completely reversed by the beginning of 1955.

Expansion of industrial facilities, particularly in the Pacific Northwest, is a factor in the improved outlook for 1955, population increases and the trend toward producing locally a greater portion of the West's material requirements for the long term.

Much of the sharp growth of Western population following World War II resulted from the influx of people who became acquainted with the West through military service. With this factor largely expended and with relatively favorable business conditions throughout the country, the movement of population from other areas should decline.

"Desire to migrate"

Western population growth will continue and even perhaps accelerate—the momentum already exists, and I see nothing in the immediate future to change the desires of Middle Western and Eastern people to migrate to the West to enjoy better living conditions. With them, of course, comes the need for more products—Western made items.

"Labor-management cooperation"

Growing ability of the West to produce basic durable goods, increased use of natural gas, continuing growth of our population and increasing cooperation between labor and management in most areas are the most outstanding trends in the West.

Our population growth should accelerate because of the growth of industry, climatic conditions, and the restlessness of our increased youthful population.

"Influx absorbed"

The next five years should see a marked increase in the growth of all light manufacturing industry. As the second or third largest cotton producing state, we should certainly develop our cotton goods manufacturing to the limit. The cotton is here—why ship it elsewhere for processing and fabrication?

Population will grow at an accelerated rate as long as we have continuing industrial growth. Before World War II, the West Coast was way behind industrially. Since then we have had a tremendous influx of people, yet industry has absorbed them as fast as they have come.

"A growth country"

Growth in population will continue for another 20 years, because we are a growth country. We have had a great many soldiers going through California to the Far East who have taken a great liking to the country and there seems to be more opportunity here and higher wage scales and better social benefits.

Western needs voiced

Regardless of existing conditions, we should take a long range look at our neighbors across the Pacific and make plans to market our products there and in turn provide markets for them.

We must set up adequate industrial areas, properly controlled but not so restricted they cannot operate.

Pollution of air and water in communities should be studied carefully and good judgment exercised to minimize future dangers and reduce excessive correction costs.

A good segment of the region's economy is dependent on defense activities or regional needs, and this economic base can be broadened by spreading the market over a greater geographic area.

The government wants aircraft and other manufacturing dispersed, but it is to the West's economic advantage to encourage relocation somewhere in the West.

The Northwest needs more year-around industries with high manpower requirements compared to kilowatt use. We should guard against diverting more of our potential into aluminum reduction in favor of more diversified industry.

"Even realistically"

Viewing the future with rose-colored glasses is not exactly my forte, but even viewing it realistically, I think the future of this area is encouragingly bright and promising.

The definite trend in recent years to increased local processing of our agricultural and lumber products is going to continue. The aluminum industry, which has made such a spectacular growth in the Pacific Northwest, is rapidly attracting more and more fabricating plants.

Northwest ports are annually handling steadily increasing tonnages, and that growth will be accelerated as Alaskan and Oriental markets assume more dominance. New and expanded development in the Northwest in many lines, particularly chemical, appears inevitable with natural gas becoming closer to a reality every day. Although population growth may not continue at the phenomenal rate of the last ten years, any substantial industrial growth will correspondingly bring population.

"Electronics phenomenal"

For the immediate past, the near future and possibly for several years the electronics industry will continue to show phenomenal growth trends percentagewise. Construction industry will undoubtedly establish new production records as long as the population increase keeps up and I believe this will be continuous at about the same rate or even better for several years, which means the retail industry has a bright future.

Industrial growth of the West is apt to be halted earlier by reason of power shortages than for any other specific cause.

The West has lost growth in comparison with other sections of the conutry, particularly the Middle West, in the matter of labor costs by reason of basic wages as well as the cost of fringe issues.

"Uranium and road construction"

Uranium mining and road construction are the most outstanding industrial trends in the West, now and for the next five years. Western population growth will accelerate, because of climate and working conditions. Our potential danger to be overcome is lack of water supply.

CONTRIBUTIONS OF WESTERN ENGINEERS

to the development of the industrial West

ENGINEERINGWISE the West doesn't need to take a back seat to anybody.

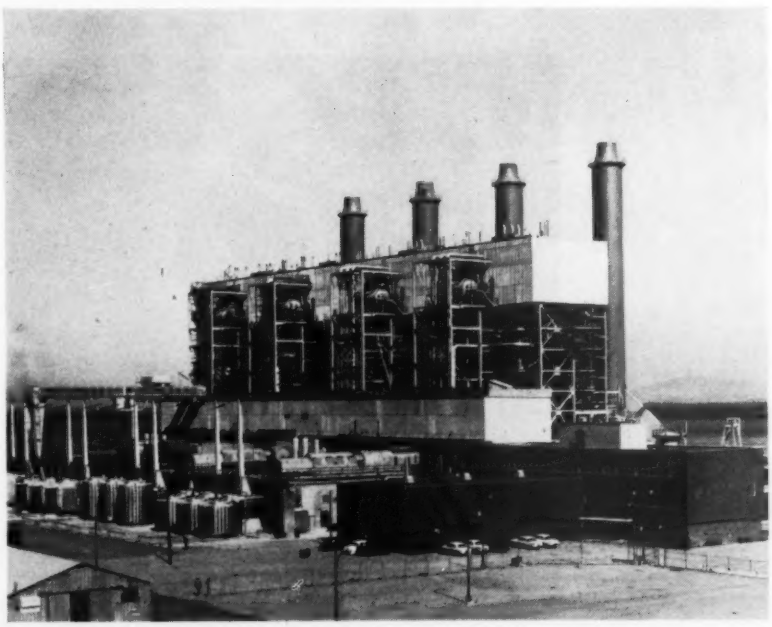
And the ranks of our engineers grow stronger every day.

These pages contain examples of Western engineering brainpower turned loose on industry.

This special feature was prepared with the cooperation of Western councils of engineering societies in San Diego, San Francisco, Denver, Seattle, Los Angeles, Albuquerque, Spokane, Portland.

Measuring soil moisture

IRRIGAGE soil moisture measuring equipment promises to result in greater crop yield and appreciable savings in power and water for the farmer, especially when used under modern irrigating conditions. Gypsum plugs lie entirely below ground, safe from damage, and require no maintenance. Moisture conditions can be accurately determined in any type soil at depths of 6 to 24 in. by plugging a portable meter into the gypsum stakes and taking readings. Both system and equipment have been developed by Rayturn Corp., Portland, Ore.

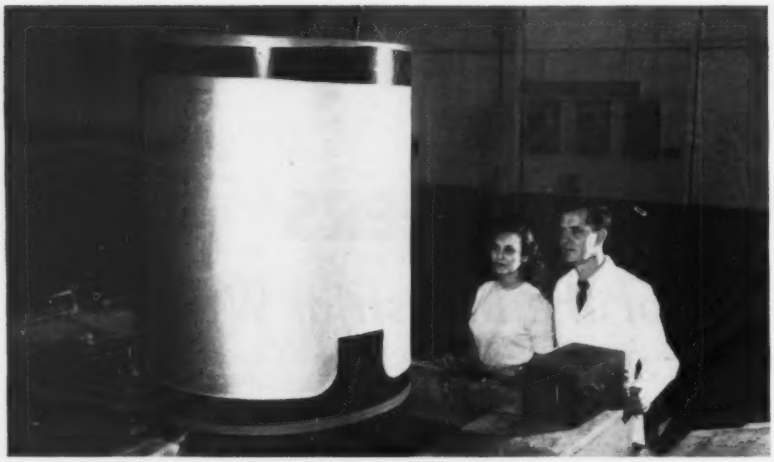


New generating plant

LARGEST STEAM PLANT west of the Mississippi at Pittsburg, Calif., combines the latest know-how in engineering and design resulting in low operating costs and a cost of only $120 per kilowatt of capacity. Unusual compactness has been achieved by setting turbine generators side by side with axis at right angles to the length of the boiler building — new in a plant of outdoor design.

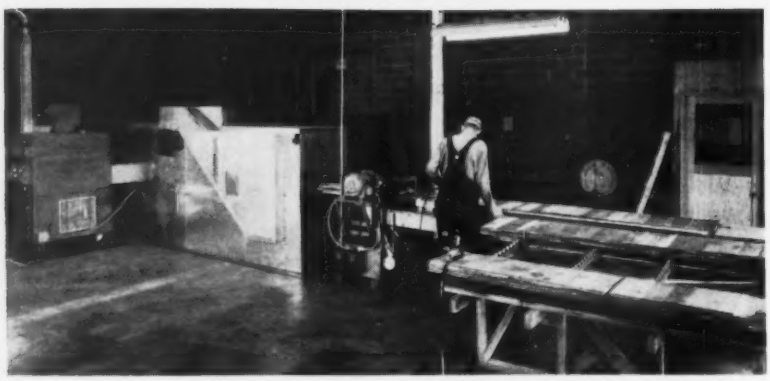
This 600,000 kw. capacity plant belongs to Pacific Gas and Electric Co., which selected the basic plant arrangement and major equipment. Engineering and construction was handled by Bechtel Corp.

CONTRIBUTIONS OF WESTERN ENGINEERS



Chemical milling

FORMED AIRCRAFT PARTS such as this curved skin can be chemically milled without warpage or rejection. Dark portions are specially masked, while light areas are exposed to a chemical solution. Electronic control assures accuracies of .002 in. Developed jointly by North American Aviation and Turco Products, Los Angeles, and licensed to the latter.

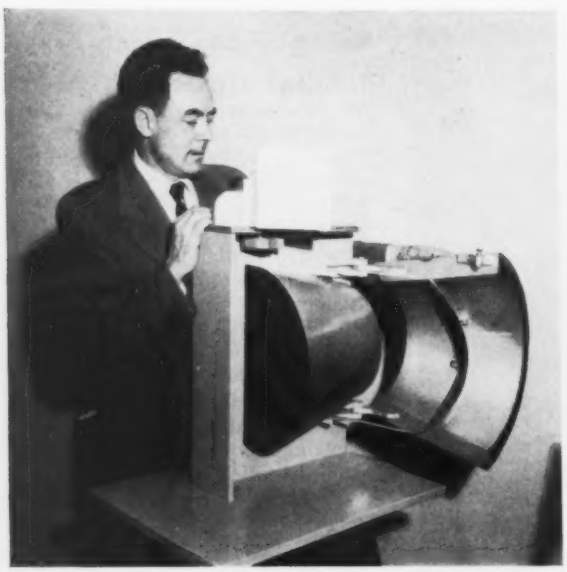


Shake siding in sheets

SIDING SHEETS, combining the advantages of plywood (large size) and cedar shakes (durability), offer an easily applied building material for home construction. Shake-A-Ply comes in sheets—8 ft. x 18 in.—using shakes as outside surface on a core of veneer stock. The new product is made by The Shake-A-Ply Co. of North Portland, Ore.

Jet brakes

A REVERSE THRUST device has been developed to enable jet transports, bombers, and fighter planes to make landings at the majority of existing airports under all runway conditions. The "thrust-reversers" have been designed by Boeing Airplane Co. of Seattle, Wash.



Post-hole blaster

POST-HOLE DIGGING without the digging is the aim of a new method of blasting using primacord. A one-inch hole is auger-drilled and several strands of primacord inserted. An electric blasting cap detonates the charge, leaving a clean hole. Stanford Research Institute.

Electric gas melting

GLASS MELTING with electricity — a first for the Pacific Northwest — offers better quality glass, since electric heat can be placed exactly where wanted and can be accurately controlled.

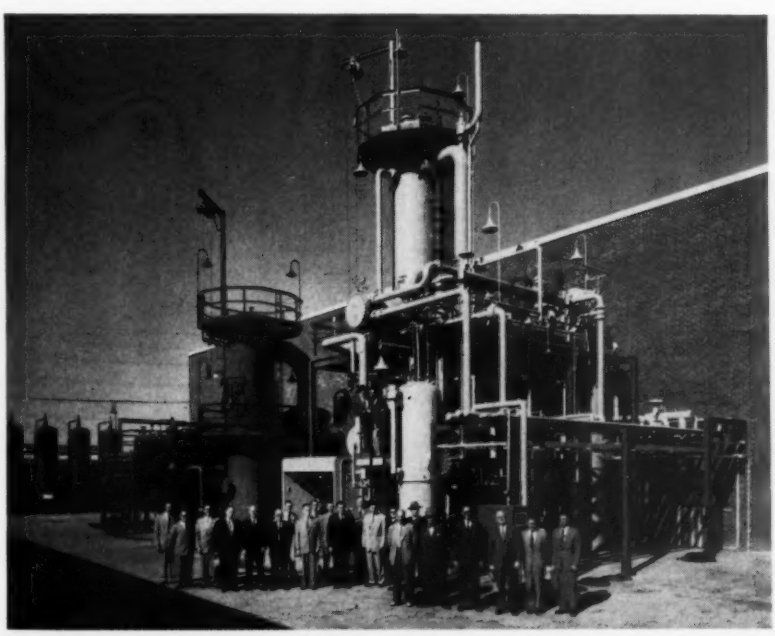
Electric melting equipment pays for itself in improved production efficiencies and allows the use of smaller melting units than would otherwise be practical. Electric melting was developed and two units installed at Northwestern Glass Co., Seattle, Wash.

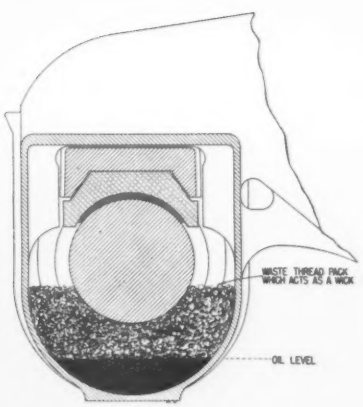
Acid from low-grade ore

SULFURIC ACID is for the first time being recovered from low-grade copper ore mined in Yerington mine at Weed Heights, Nev., by Anaconda Copper Mining Co. Four FluoSolid reactors are the heart of the extremely flexible acid plant built by Chemical Construction Corp. The plant can operate at capacity of 250 tons of 100% sulfuric acid per 24 hours, using a low-grade ore containing 25-30% total sulfur.

Petroleum research

FORTY-THREE member companies of Fractionation Research Inc., an organization formed to study the performance of fractionating equipment, met recently in Los Angeles to plan a program of investigation and study of various distillation devices. Many of the studies will be made in a new experimental distillation plant test unit designed, constructed, and staffed by C. F. Braun & Co. adjacent to their research center in Alhambra, Calif.

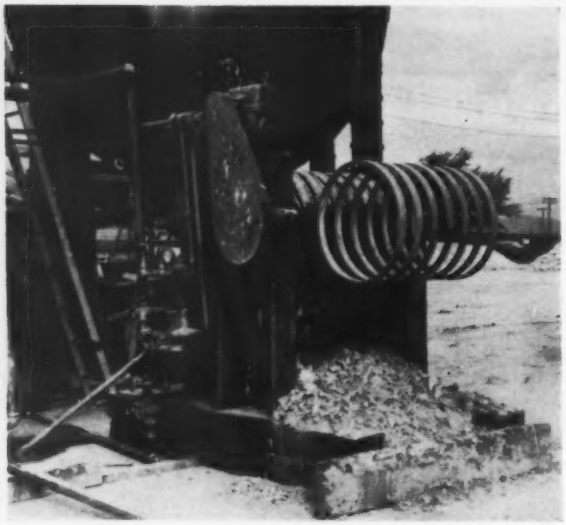




Lube system for freight cars

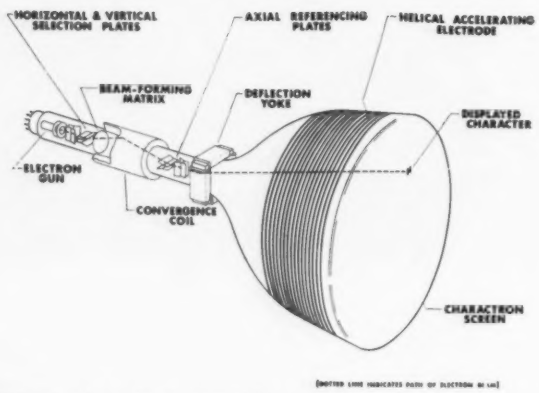
A NEW SYSTEM of lubricating devices effectively seal freight-car journal boxes at both ends to prevent loss of oil and also keep out harmful dirt and water. One device provides a continuous bath of oil to all parts while remaining components prevent the journal from being damaged. System was developed for the Union Pacific by a research group headed by Lloyd A. Johnson, president of National Motor Bearing Co., Inc., Redwood City, Calif.

CONTRIBUTIONS OF WESTERN ENGINEERS



Continuous mineral filtering

CONTINUOUS DISCHARGING of filtered minerals is the result of a plate-and-frame filter system made up of two series of rings operating on an automatic cycle. One set of rings is in the filter during the filtering process while the other dumps filtered mineral cake outside the machine. The two sets of rings are set 180 deg. apart. The Burwell plate-and-frame filter was developed by Blair Burwell of Minerals Engineering Co., Grand Junction, Colo.

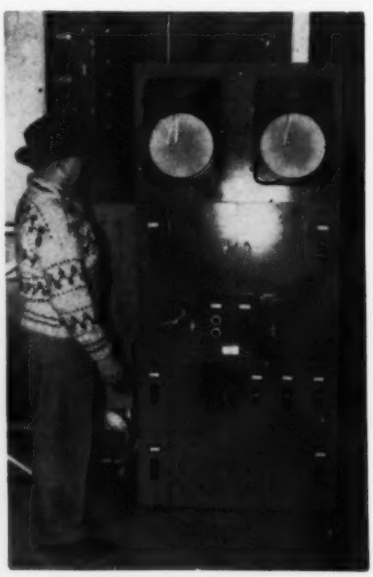


Electronic shadowgraph

CHARACTRON is a cathode-ray tube employing a beam-forming matrix with suitable driving circuitry. When fed with signals from an electronic computer, radar, or Morse code, it displays alphabetic, numerical, or symbolic configuration at speeds in excess of 25,000 characters per second. Conceived by Joseph T. McNaney, Convair engineer, San Diego; manufactured there.

New lumber kiln

AIR CONDITIONING and ventilating principles applied to the drying of lumber have resulted in a very successful new dry kiln, the temperature and humidity recorders of which are shown below. Kiln includes the equivalents of the compressor, condenser, and evaporator of standard air conditioning. It was designed and built for Harter Lumber Co., Spokane, Wash., by Cliff Guthrie.

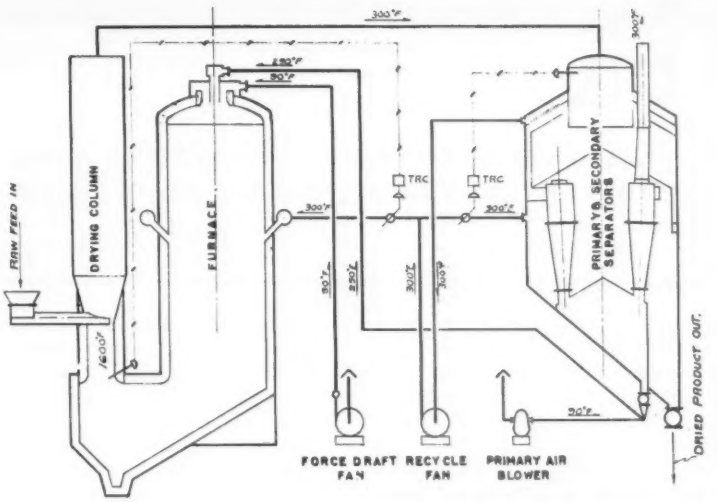


Supersonic wind tunnel

A WIND TUNNEL operating at up to three and a half times the speed of sound is being built to serve the aircraft industry's needs for testing at supersonic speeds. Built in three separate sections, the wind tunnel when completed will be one of the largest and fastest test facilities in the nation. Designed by engineers of Ames Aeronautical Laboratory, Moffett Field, Sunnyvale, Calif. The new tunnel is part of the Unitary Wind Tunnel Plan.

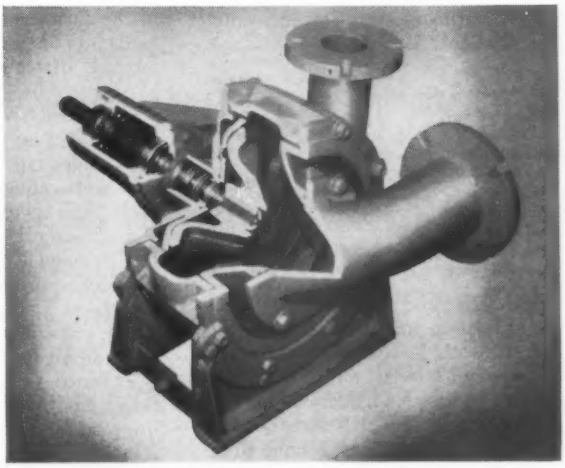
Efficient coal dryer

A NEW PROCESS for removing both inherent and surface moisture from finely divided materials is being used to convert relatively poor West Texas lignite coal into a very efficient heat source. The coal dryer utilizes fluidized and entrained drying in a column of hot inert gas. High temperatures and heat transfer rates dry the material in a matter of seconds without adverse effects. Installations in the coal industry realize thermal efficiencies of over 90%. The Parry coal dryer was designed and built by Silver Engineering Works, Inc., Denver, Colo.



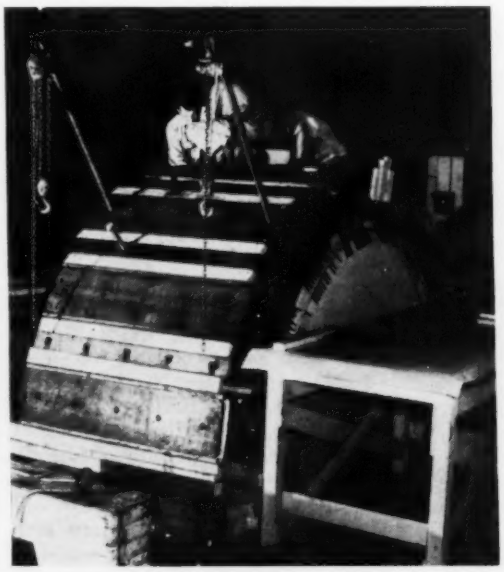
A pump for solids

CONCRETE, fresh fruit, or even goldfish can be pumped without damage thanks to a new principle for moving materials. The pump impeller is similar to an automobile fluid drive, and though entirely out of the material flow pattern, it induces a vortex that does the pumping. This torque-flow solids pump is made by Western Machinery Co., San Francisco, Calif.



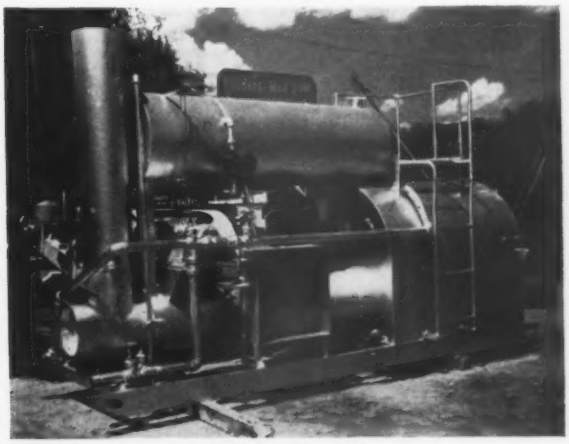
Quick change of field coils

OVER 160 HOURS of down-time saved by a device designed to speed up the changing of field coils on one half of a 3,500-hp. plate mill motor at Kaiser Steel Corp.'s Fontana, Calif., mill. New fixture, designed by plant's electrical maintenance department under B. A. Shrive, reversed the usual method of doing the job. The entire upper shell was placed on a form, pole faces blocked, and shell unbolted and removed. Coils were changed from above in only 48 hours.



New circulating heater

AN AUTOMATIC oil circulating heater designed for heavy heating fluids and asphaltic materials that obtains 80% efficiency using gas or liquid fuel has been put on the market. It will heat from three to six times faster than heaters using steam, at a third less cost. Designed and built by W. L. Childers Manufacturing Co., Albuquerque, N. M.



Western Outlook

OIL

Better year in 1955 forecast; 1954 off a little. Crude oil supply keeps competition in West tight.

PETROLEUM usage in the Far West in 1955 is expected to be 3.6% above 1954, following a slight decline of 0.5% in 1954 from 1953, according to Marion E. Dice, manager of the economics department of General Petroleum Corporation. His estimate of the various liquid fuels is as follows, assuming a normally cold winter contrasted to the warm winter of 1953-1954:

	1954 vs. 1953	1955 vs. 1954
Civilian domestic demand		
Civilian motor gasoline	up 1.9%	up 3.8%
Stove oil, diesel and heating distillates	up 3.1%	up 9.2%
Residual fuels	down 8.0%	up 2.4%
Total petroleum (excluding natural gas)	down 0.5%	up 3.6%

Residuals and industrial heating oils have been unable to gain in the last two years because of the inroads of large additional out-of-state gas supplies. With no further increase in gas imports expected before December 1955, residuals may resume their nominal upward trend but will probably continue in long supply, despite shipments to the East Coast. This should be substantially offset by decreases in lighter stocks, and total inventories should stay fairly constant.

For the long range, possible solutions include the addition of proper equipment to reduce residual yield and greater use of lighter crudes in the area as total demand rises and local supplies must be augmented.

Total demand for California increased only about 35% from 1946 to 1955, whereas the increase east of California is estimated at perhaps twice that amount, due to the fact that in the East heavy inroads have been made into the use of coal and that California's increase in energy demand has largely been met by natural gas.

Continued intense competition is expected this year on the West Coast, because adequate crude oil availability, excess refinery capacity, and relatively high inventories suggest an excess of potential supplies over probable demand. One forecast is for an 8% decline in military demand, while export and intercoastal shipments should remain essentially unchanged.

Crude oil production in California is expected to be about 25,000 bbl. daily under 1954 levels. due mainly to lower exploration activity.

In the Rocky Mountain area, however, drilling activity is high. For the first nine months of 1954, Colorado topped Wyoming for the first time with 952 completions. Wyoming had 13 less, and Colorado's crude oil production is now around 137,000 bbl. a day, compared with 64,000 in 1949.

Richfield Oil Co. has undertaken an informational program on conservation of oil by "unitizing." This calls for an operating agreement covering all the wells in an oil pool so that the oil can be taken out by the most efficient means instead of the "each for himself" method which causes wasteful practices. Recovery is much greater under unitization.

The distribution pattern of products manufactured in California will undoubtedly be changed by the two new refineries (General and Shell) in Washington which have a combined capacity of about 85,000 bbl. daily. They will be served largely by the trans-mountain pipeline from Alberta, which has a capacity of 150,000 bbl. daily but has only been transmitting around 40,000 bbl.

Another factor will be the completion of the Yellowstone pipeline to bring Montana products from Billings to the Spokane area. Standard of California has bought 2,000 acres north of Edmonds, Wash., for a refinery, and it is reported that still another company has acquired property in Tacoma for a refinery there.

For the four years from 1954 to 1958, an increase in demand for five Western states (the three Coast states, Arizona, and Nevada) of 15%, or 1,055,800 bbl. daily, is forecast by Austin Cadle, manager of the economics department of Standard Oil Co. of California. He breaks the figures down as follows:

Increase in civilian domestic demand for petroleum 1954-1958

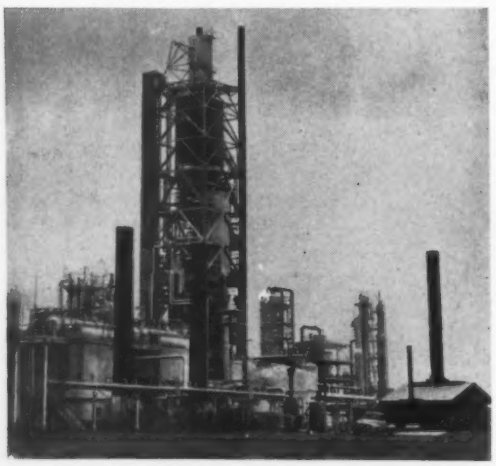
	Percent	Barrels daily
Aviation gasoline (including jet)	41	22,400
Motor gasoline	19	447,500
Distillate fuels	16	152,900
Residual fuel	7	272,400
Total, all products	15	1,055,800

Adding military, export, and intercoastal, total petroleum demand increases from 1,184,000 bbl. daily in 1954 to an estimated 1,306,000 in 1958.

Total energy demands in the area are estimated by Mr. Cadle to increase from 4,000 trillion Btu's in 1952 to 5,500 trillion in 1965, a span of only 13 years.

These estimates make full allowance for natural gas imports, both from Texas/New Mexico, which already amount to some 1,400,000,000 cu. ft. daily and into the Northwest from either U.S. or Canadian sources. In heat value, this is the equivalent of over 200,000 bbl. per day of fuel oil.

Capital expenditures in 1955 for refining facilities on the West Coast will be 17% below 1953, one source estimates. While there has been consider-



FIRST UNITS of the first major oil processing plant in Washington have been completed by General Petroleum Corp., Ferndale, Wash.

able construction of catalytic reforming capacity in the last two years, there is still a need for the installation of additional reformers in West Coast refineries, and continued construction of such units at a continuing high level is expected. This demand results from the upward trend in gasoline octanes.

Union Oil reports that with the advent of their "Unifining" process it is now possible to convert low quality, high sulfur crude oil into high grade petroleum products. With the completion of their new refinery at Santa Maria and additional facilities at Oleum, Union will be in a position to process 20,000 bbl. a day of Santa Maria crude into the minimum amount of fuel oil and the maximum amount of high octane gasoline.

Their first "Hyperforming" process, which converts in a single step mixtures of straight run and cracked gasoline, high in sulfur, into low in sulfur, high octane gasoline is just going into operation. The first unit is at Calstate Refining Co.'s refinery at Signal Hill.

The new process for fluid coking appears to offer real promise for West Coast refiners who are once again plagued with the disposition of heavy stocks of residual fuel oil. Providing the first commercial installation of fluid coking for Carter Oil Co. lives up to expectations, it is reasonable to predict installation of substantial fluid coking capacity on the part of Pacific Coast refiners in the next few years.

Forty-three petroleum and chemical companies have joined in financing Fractionation Research Corp. to pool jointly their research into the mechanics of distillation, in the hope of improving processing equipment. An experimental distillation unit for this research is under way at the plant of C. F. Braun and Co., Alhambra, Calif. Research facilities and the engineering and operating staff are being provided by Braun. Technical director for the program is F. W. Winn.

During the year Standard completed the following three projects:

A catalytic cracking plant project at the El Segundo refinery, consisting of a 40,000 bbl.-per-day cat-cracker and a 52,000 bbl.-per-day residuum stripper.

A $4,000,000 phenol plant, first of its kind in the West, at the Richmond refinery.

A new $10,000,000 refinery at Vancouver, B. C. (by Standard Oil Co. of British Columbia, a subsidiary).

Completion is scheduled for April of twin catalytic reforming plants at Standard's Richmond and El Segundo refineries. They are the nucleus of a $30,000,000 program designed to step up gasoline octane ratings.

Salt Lake Refining Company, a subsidiary, is constructing a $2,500,000 catalytic cracker at its Salt Lake plant, to be completed in May.

A plant for the production of isophthalic, important chemical intermediate for the manufacture of plastics and surface coatings, at the Richmond refinery was to begin early this year.

Western refineries
as of January 1, 1954
(barrels per day)
from Bureau of Mines

	Number		Crude oil through-put capacity		Capacity of cracking plants to produce cracked gasoline	
	Operating	Total	Total	Building	Total	Building
California	43	48	1,232,400	15,000	234,535	.....
Colorado	7	7	37,150	.....	6,725	.....
Montana	9	13	61,950	800	16,970	.....
New Mexico	7	8	23,550	.....	13,380	.....
Oregon	1	1	6,500	.....	.....	.....
Utah	5	5	73,500	500	17,937	.....
Washington	1	1	4,000	85,000	.....	16,700
Wyoming	12	15	107,190	.....	30,534	.....

Western Outlook

OIL HEATING

Furnace and fuel sales are still rising in the face of natural gas for Northwest.

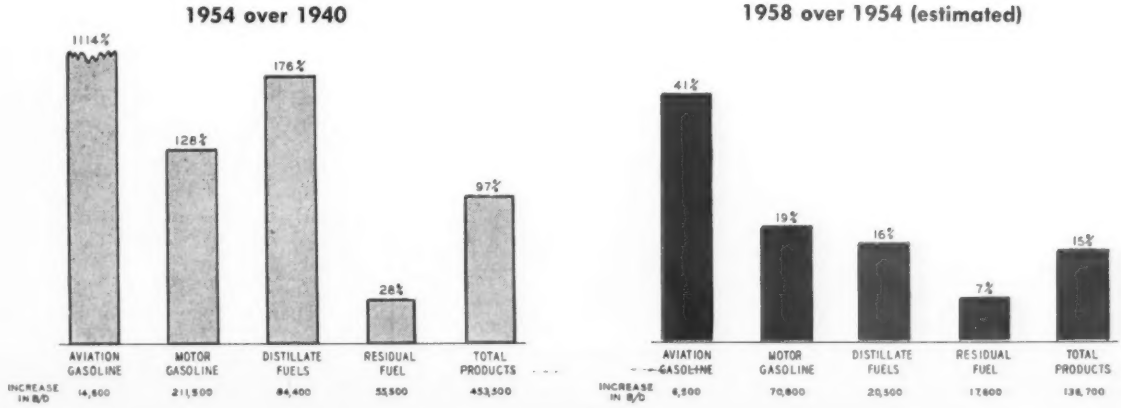
DISTILLATE heating oil sales for Washington and Oregon are now more than 45,000 bbl. a day, compared with less than 23,000 bbl. in 1946, and by 1958 the total demand for heating oils should be well above 50,000 bbl. daily, despite natural gas competition, according to H. G. Vesper, vice-president of Standard Oil Co. of California.

Heating oil and diesel fuel consumption in the West has risen

Factory shipments of oil-fired central heating equipment to the eleven Western states (not including space heaters or portable oil-fired heaters) are reported by the Oil Heat Institute of America as follows:

	Conversion burners	Oil-fired warm air furnaces	Boiler burners
1954 (est.)	6,582	45,711	1,245
1953 total	12,728	22,309	1,976
1952 total	38,349	12,283	4,525

INCREASE IN PETROLEUM DEMAND
Civilian domestic — Five Western states
(Calif., Ore., Wash., Ariz., and Nev.)
Economics Department, Standard Oil Co. of Calif.



Western Outlook

GAS

New pipeline plan to supply Pacific Northwest from both Southwestern and Canadian gas fields.

THE Pacific Coast experienced a spotty year during 1954 and its utility companies did likewise. While the pipeline controversy up north kept that area unsettled, California utilities had a very good year and the Mountain states showed a good percentage of new customers.

There are now over 3,000,000 gas customers in the three Coastal states and an additional 700,000 customers in the Mountain states. The number of customers for the West as a whole rose nearly 5%, with the Mountain states showing an increase of nearly 8% during 1954.

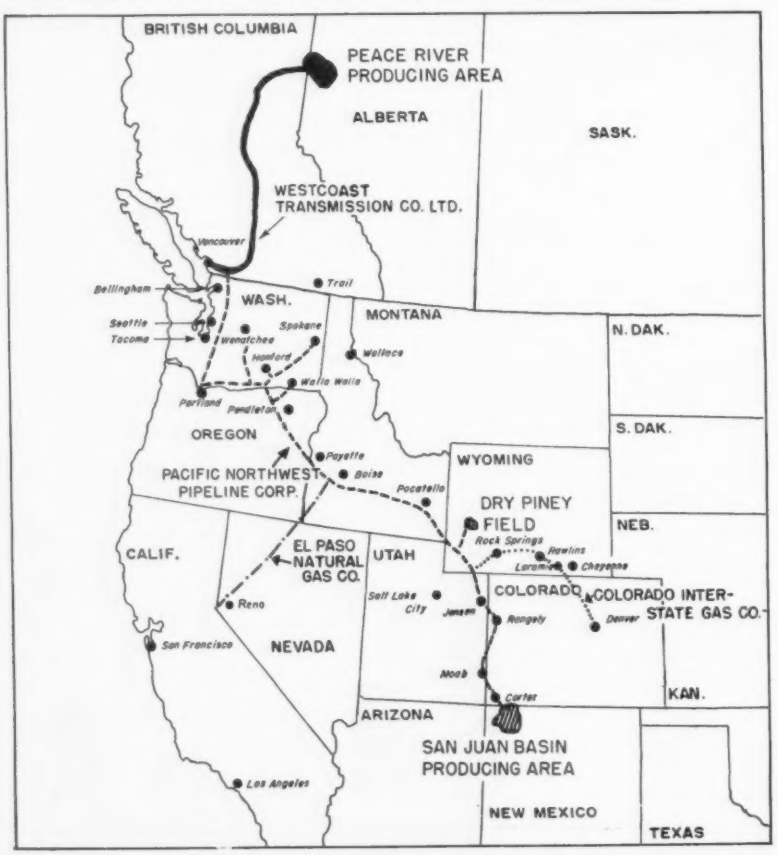
The outlook for 1955 is equally good, pushed on by an expanding population, expectation of a good home construction year, and the trend to suburban living. Gas customers in California have increased 38.5%, gas sales 64%, and capital investment 92.5% since 1946. Meanwhile, capital expenditure to connect a new customer to the line has gone from $300 to $600 since 1940. California's capacity to deliver out-of-state gas now exceeds 1,500,000,000 cu. ft. per day, or close to 80% of the state's needs.

Predictions of the increase in gas sales vary from 40% within the next five years to 300% for the period 1950-1975, depending upon the growth of population, rapid commercial development, and industrial expansion.

Gas rates were increased by the California Public Utilities Commission for Pacific Gas and Electric and Southern California Gas Co. in 1954. PG&E's rates were boosted around 3% for interruptible service and around 6.3% for firm service. PG&E increased out-of-state imports by 150,000,000 cu. ft. during the year and as a consequence had to readjust its Northern California facilities for more efficient operation. The interest in underground storage facilities has lessened somewhat because no tight structures appear to be available. Further, any company storing gas must own the land beneath which the gas is stored to prevent the supply being tapped from above.

The percentage of state fuel coming from out of state has increased steadily through the past years, and all indications point to even larger imports of both fuel oil and gas.

AT YEAR'S END an agreement between Westcoast, Pacific Northwest, and El Paso brought about this proposed gas line network to use gas from both Peace River and San Juan Basin.



Pacific Northwest

The Pacific Northwest is still the largest area in the United States without natural gas. After more than a year of hearings, the Federal Power Commission has granted a certificate of convenience and necessity to the Pacific Northwest Pipeline Corp. to construct a gas pipeline connecting the Pacific Northwest with the San Juan Basin in New Mexico, despite the fact that the Commission's technical advisors voted overwhelmingly for the alternate plan—a pipeline connecting the Peace River fields of northern Alberta and British Columbia with the Pacific Northwest.

So far, however, the FPC's decision has failed to bring either gas or the promise of gas in the near future to the Pacific Northwest. The feasibility of the PNP Corp. line has yet to be proven. The real key to what happens next in this respect lies in the firm cost of gas at city gates.

This lack of firm costs and firm rates seems to be the crux of the problem. With the exception of Portland Gas and Coke, practically all distributing companies in the state of Washington have signed unconditional agreements to purchase definite quantities of gas at whatever the city rate may turn out to be. Portland Gas and Coke, by virtue of considerably lower costs, offers a gas rate considerably below that offered elsewhere in the Pacific Northwest. Because of greater acceptance in Portland, PG&C sells nearly twice as much gas as the combined sales in Seattle, Tacoma, and Spokane.

Since the PNP Corp. has refused to guarantee any sort of rate structure, PG&C cannot afford to sign a "take or pay for" type of contract. Production costs in Portland place an

absolute ceiling on what Portland can pay for any quantity of natural gas.

The FPC requires no specific tariff rates as a condition of the certificate granted to PNP Corp. Under the Natural Gas Act the ultimate rates would be based on a "rate of fair return" after costs of constructing a pipeline and drilling the wells are known.

As a result of the FPC's decision to favor PNP Corp., Westcoast Transmission Co. (which was to build the line from Canada) has filed an appeal of the decision. According to the terms of the contract, PNP must submit a plan of financing satisfactory to the Commission and must begin construction of its facilities on or before Jan. 1, 1955. The completion date specified is not later than Jan. 1, 1957.

Capital needs

Estimated capital needs are $160-$200,000,000. Of this 75% is to come from outside loans, probably from the large insurance companies. The other $40,000,000 will come from equity, stock sales, etc. At this writing, it seems certain that neither financing nor construction will have begun by January 1. Insurance companies considering the financing of the project will undoubtedly make exhaustive surveys of their own to determine the line's feasibility and the likely city gate rates.

Another factor disrupting the plans to go ahead with the pipeline is the intense interest of Pacific Gas and Electric Co. in securing gas from the Peace River fields for California. Under the present law, Canadian gas cannot be imported as the sole source for the Pacific Northwest. This means that Canadian gas can be piped into the Pacific Northwest only after the PNP Corp.'s pipeline is built and in operation.

Colorado Interstate

During 1954 Colorado Interstate's construction program included a further strengthening of gathering facilities with the addition of more than 100 miles of new lines.

The company drilled 38 wells, and a total of 35 wells were completed as gas producers.

Sales volume jumped from approximately 175 billion in 1953 to 193 billion in 1954. This was an increase of approximately 10½%.

Just before the close of the year, a new system peak day delivery of 757,000,000 cu. ft. was established, of which 542,000,000 was delivered out of the company transmission system.

Natural Gas Producers, Inc., a wholly-owned subsidiary of Colorado Interstate, has filed with the Public Utilities Commission of Colorado an application to build facilities to market gas from northeastern Colorado fields to the city of Fort Morgan and to Colorado Interstate for resale in Denver. The line, connecting to Colorado Interstate's system, will have a designed capacity of approximately 35,000,000 cu. ft. per day.

During 1955, construction is expected to start on 364 miles of 22-in. pipeline from Rock Springs, Wyo., to Denver. At Rock Springs, this line will connect with the PNP line from the San Juan Basin to the Northwest.

At the outset, plans call for about 100,000,000 cu. ft. of gas per day through this proposed line. Its capacity can be increased to 200,000,000 per day by the addition of horsepower. The company has obtained pipe commitments and started preliminary work. Since it will be dependent initially upon the Pacific Northwest project as a source of supply, the timing of Colorado Interstate's construction schedule will follow that of PNP.

El Paso Natural Gas Co. has determined to maintain and expand its role as the big supplier of natural gas on the Pacific Coast, and it is logical to expect it to draw on nearby Canadian reserves (Pincher Creek) as well as on Permian Basin and San Juan Basin reserves.

The gas-rich but little explored Intermountain area will experience the promised wildcatting and development boom, regardless of the fate of the PNP line because all gas that can be developed in the Intermountain area can be utilized profitably by Mountain Fuel Supply Co. to take care of the Salt Lake City market, Provo, Ogden, and eventually the more populous communities of southern Idaho.

At last report

Late in 1954 it was announced that a contractual agreement between El Paso Natural Gas Co., Westcoast Transmission Co., Ltd., and Pacific PNP Corp. had been reached by which Canadian natural gas from the Peace River fields would be made available to the Pacific Northwest.

Westcoast plans to build a thousand-mile $120,000,000 line from the Peace River area. Preliminary work will begin this year. This line would sell 300,000,000 cu. ft. of gas daily to PNP Corp. for delivery near Vancouver, B. C., to a pipeline to be constructed by PNP Corp. from the San Juan Basin to Vancouver. This would be a 1,466-mile, $160,000,000 line going through New Mexico, Colorado, Wyoming, Idaho, Oregon, and Washington.

El Paso under this agreement would buy 250,000,000 cu. ft. daily from PNP. This gas would find its way to California customers through a 370-mile, $35,000,000 pipeline system to be built by El Paso from Mountain Home, Ida., to Reno, Nev., within the next three years. Contracts now call for PNP to deliver 150,000,000 cu. ft. daily to El Paso on November 1, 1957, increasing to 250,000,000 cu. ft. by January 1, 1959.

Trans-Northwest Gas, Inc., is expected to withdraw its court action protesting the FPC decision.

Benefits

However, when natural gas comes to the Pacific Northwest, approximately 3,500,000 people will benefit. Natural gas would help alleviate the critical power shortage by saving an average of 150,000 kw. and approximately 12,000,000 bbl. of oil per year.

Price to the ultimate user is a critical point in the Pacific Northwest since 85% of the demand for gas will compete with oil. Of this percentage, 51% is expected to displace heavy residuum oil in industrial loads, and 34% will displace burner oil and space heating.

The presence of natural gas in the Northwest would also attract industries which prefer closely controlled direct heat, providing greater industrial use of both gas and electricity.

Although PNP Corp. has testified that there is not a large volume of interruptible industrial load on the Coast because of this competition with low cost fuel oil, the prospects of reasonable gas should serve to attract industry to the Northwest.

Experienced engineers have indicated that the Northwest needs steam-electric power to firm up its hydro-electric power. By the combustion of gas, thermal power can be converted into electric power also. Gas, in efficient boilers and steam engines, converts thermal power into mechanical power. The steam turbines directly connected to electric generators convert mechanical into electric power. It is quite possible that the time will come when electric power could be generated by gas in the Pacific Northwest as is presently being done in the Southwest.

In rural areas gas can be used directly on some crops for drying and roasting. Freshly mowed hay or alfalfa is processed in various parts of the country in gas-fired dryers and stored away to provide food for livestock in the winter. Introduction of natural gas could lead to the establishment of a large petro-chemical industry such

as ammonia (basis for a large number of fertilizer compounds), alcohol, plastics, fibers, synthetic rubber, and detergents.

As far as gas resources go, a synthetic gas of the same characteristics existing in natural gas may well be available from coal mines by the time natural gas resources are exhausted. Experimental work done on a commercial scale by the government in cooperation with industry has demonstrated that the process is feasible and practical. A grid of the country's natural gas pipeline system shows that present pipelines are prepared to pick up gas in practically every important coal center in the country and transmit it through lines that now carry natural gas. It is estimated that this combination of natural and synthetic gas and coal mines can take care of the country's need for 2,000 years.

New Mexico

A study of natural gas in New Mexico by the Bureau of Business Research at the University of New Mexico, Albuquerque, looks at that state's gas resources in a different light. They indicate that natural gas is one of their most important national resources and has a great variety of uses, and these many uses compete for an exhaustible supply of this strategic resource.

Some of the possible uses are economically more valuable than others and a few are downright wasteful. Different areas compete for natural gas as an important fuel and raw material for industrial development. How this exhaustible supply of gas is used in the face of such competition is a matter of grave national concern.

New Mexico is capable of producing far more gas than can presently be consumed in the state in economical and useful ways. It is already exporting large quantities to California, and the prospects are for increasingly greater exports during the coming years.

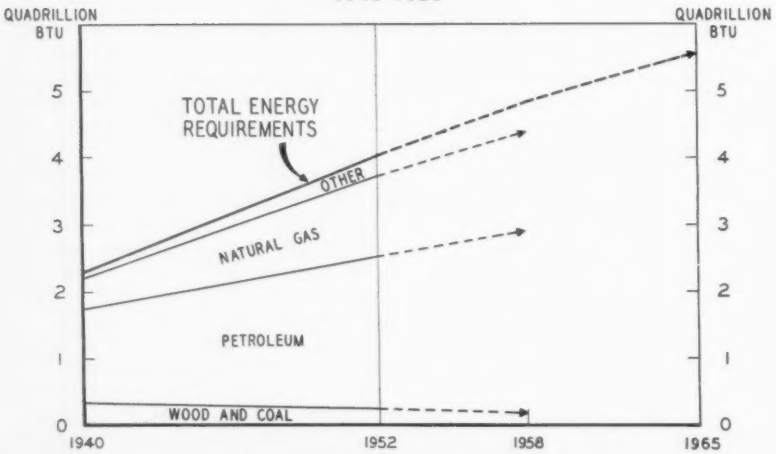
Most of the natural gas is publicly owned, which means the citizens and public officials have an obligation to see that it is put to uses which in the long run will be most beneficial to the people of the state. But little if anything is being done to insure that this gas is contributing to the state's industrial development. Possibly new industry is not what the state can best hope to get from its gas. But if New Mexico's natural gas is to contribute to the development of other areas, then the citizens of New Mexico should get a commensurate return—more, it might be said, than they are presently getting.

New Mexico has wasted as much gas or more, proportionate to gross production, than Texas or Oklahoma did during their days of exploitation. Waste of gas in New Mexico has been so extravagant that in some years the amount of waste greatly exceeded the amount used. Waste in 1938 was 230% of marketed production, and even as recently as 1947 it was 63%.

Waste control

Most of the waste was wet gas produced with oil, and the common practice was to extract the oil and flare the gas. Continued high loss was finally stopped in 1948 when heavy shipments to California began. Since then, wasted gas has dropped to 7.9% of marketed production, the lowest since New Mexico began production.

ENERGY REQUIREMENTS
Five Western states
(Calif., Ore., Wash., Ariz., and Nev.)
Economics Dept., Standard Oil Co. of California
1940-1958



LP-GAS

Substitution of propane for acetylene continues to expand. Many other new uses.

SUBSTITUTION of propane for acetylene in cutting steel continues to expand. Largest operation is at Mare Island, where the Navy is cutting up obsolete ships and other heavy material for scrap. Many steel fabricators also use propane for cutting out shapes.

Longer preheat time (several seconds) is required, but after cutting starts progress is faster, with cleaner cuts requiring less chisel work to finish. Propane costs less than acetylene, consumes less oxygen, but is not as effective or fast for welding.

Numerous applications show up in mining, such as drying concentrates, breaking down iron impurities (pyrites and garnet) to facilitate magnetic separation, reduction of mercury ores, small scale smelting, providing motive power where utility current is not available or costs more, expanding perlite, dehydrating lightweight aggregate materials to reduce shipping weight.

Propane is now being used for curing cement blocks by direct heat without steam, showing considerable reduction in Btu. consumption.

Clean combustion without soot, oily residues, or odors permits direct firing of heat-cured products subject to contamination, such as ceramics, dehydrated fruits, smoked meats, alfalfa products.

Operators of two plywood kilns installed in the Northwest during the past two years, using direct heat instead of steam, report approximately 35% lower installation costs, 20% less drying time, less rendering of pitch, lower percentage of rejects, reduction of fire hazard due to inert nature of atmosphere in kiln.

Seasonal operations, such as cotton ginning and rice drying, find that total cost of liquefied petroleum gas is lower than utility gas in spite of price differential on Btu. basis. There is no standby charge with the liquid fuel.

Numerous large operators, including Lockheed, Menasco, Ralphs Grocery, Metropolitan Warehouse, Western Carloading, eliminate air pollution caused by gasoline engine exhaust by operating fork lift and industrial truck engines on propane. Analysis shows negligible carbon monoxide concentration and elimination of soots.

ELECTRIC POWER

Pacific Northwest outlook brightened by plans for short and long-range hydroelectric power projects.

AS usual the Pacific Southwest (Arizona, Nevada, Central and Southern California) shows one of the brightest electric power pictures in the nation. In contrast to this, the electric power outlook for the Pacific Northwest, while still one of the nation's poorest, offers a brighter outlook than it has in some years.

Estimates of capacities as compared with peak demands, in megawatts, from the Federal Power Commission:

Year	Pacific Northwest (Region 7) Peak demand	Pacific Northwest (Region 7) Dependable capacity	Pacific Southwest (Region 8) Peak demand	Pacific Southwest (Region 8) Dependable capacity
1954	7,500	7,209	8,321	9,311
1955	8,100	8,420	8,900	10,718
1956	8,750	9,010	9,520	11,207
1957	9,330	9,255	10,210	11,367
1958	9,900	....	10,920	.....
1959	10,400	....	11,690	.....
1960	10,900	....	12,500	.....

The margin of generating capacity over demand for the Pacific Southwest varies between 15% and 23% through 1956. Adequate reserves to meet a national emergency or war are considered to be 15% or better. These margin percentage figures cover all power fed into the area from hydroelectric and steam generating plants as well as power imported from other areas.

Steam generating facilities have been the chief contributor to the present high margin of overall capacity over peak demand in the Pacific Southwest. Since 1948 this area has greatly increased its generating potential so that it is now in a position to meet any peak demand or emergency.

During 1954 Pacific Gas and Electric Co. added two steam generating units at its Pittsburg steam plant. The new units, with a capacity of 312,500 kw., helped make PG&E the largest utility in the nation in area served and plant investment. Los Angeles Bureau of Power and Light added two steam generating units totaling 200,000 kw. to its Valley steam plant and improved the No. 4 unit of its Harbor steam plant to the extent of 15,000 additional kw.

Southern California Edison added the No. 5 unit to its Redondo No. 2 steam plant to boost generating capacity by 156,250 kw., and San Diego Gas and Electric Co. added a 100,000 kw. generating unit to its Encina steam plant during 1954.

The Pacific Northwest, on the other hand, has very little enthusiasm for building steam plants while hydroelectric power potential exists. The price differential so favors hydro power that as long as there is a possibility of its being available, steam plants will probably not be built.

The following chart shows how the Southwest has firmed up its generating capacity by constant expansion of steam generating facilities. Figures are in megawatts.

Year	Installed steam generating capacity	Scheduled steam generating additions
1954	5,092	...
1955	5,012	920
1956	6,432	420
1957	6,522	90

Pacific Northwest

The hydroelectric power development picture in the Pacific Northwest can be summed up as follows. There are nearly 6,000,000 kw. of generation on the line, of which some 52% is federal generation. The federal government at present has 3,100,000 kw. and with the projects now under construction will have 6,200,000 kw. within six years. New generation resulting from federal projects will average approximately 500,000 kw. a year over the next five or six years.

In addition there are projects under construction by private and public utilities. These utilities are not only making application for permits or licenses in the United States, but are also studying potential storage water in British Columbia.

Considerable dam building activity in the Pacific Northwest during 1954 indicates a far brighter long-range outlook for electric power in that area than has been seen there since the major aluminum companies moved in. A number of independent groups have been formed to work on the incredibly complex problems of the area, with two major results.

1. The Northwest's utilities are going after their own sources of electric energy independent of any federal participation. Small dams are being built and hydroelectric power capacities are being increased to take care of immediate needs.

2. Concrete long range plans, of which there are a number to choose from, are being seriously worked on. These latter plans are of a generative magnitude of around a million kilowatts.

Priest Rapids Dam

Late in 1953 the Federal Power Commission granted a preliminary permit to the Grant County Public Utility District in central Washington for further exploration of either one high or two low dams at Priest Rapids on the Columbia River. The permit sets a period of two years for further study of the site. At this time, the FPC will determine whether Grant County PUD can handle the job, whether the project should be a joint effort with the Washington State Power Commission, or whether the license should be granted to the commission. Whatever the outcome, the bickering has been temporarily quelled and the Power Commission and Grant County PUD are working together toward the same destination —the fastest and cheapest hydroelectric power from Priest Rapids possible.

Idaho Power Co. has obtained government support in its fight to get an FPC license to construct three hydro dams at Hells Canyon on the Snake River on the Idaho-Oregon border. This tips the scales against federal development of a single high dam originally proposed by the Bureau of Reclamation.

Numerous small dams in the Pacific Northwest are being undertaken by municipalities, public utilities, and private power firms. These, together with full capacity power from The Dalles and Chief Joseph Dam, are expected to take care of the Pacific Northwest's power demands through 1962.

Long range plans

Long range plans for providing needed power after 1962 will probably be taken care of by one of four projects: Mica Creek Dam, Libby Dam, Paradise Dam, or Glacier View Dam.

The region's power load has increased by 10% each year since the war and promises to do so for some time to come. The federal government's policy, under the present ad-

ministration, is said to be one of partnership. The idea, as indicated by President Eisenhower in his dedication speech at McNary Dam, is that the federal government should only build those dams and provide that hydroelectric power which the utilities and power companies therein, singly or in cooperative venture, cannot handle by themselves. Concrete government cooperation or partnership on smaller hydroelectric power is thus far a matter for conjecture. The Federal Power Commission has, however, endorsed Libby Dam as its answer to future power needs of the Pacific Northwest.

Who's involved

Three organizations are working independently to solve the Northwest's hydroelectric problems.

1. The Puget Sound Utilities Council, which was organized during the past six months and consists of a loose federation of five non-competing public and private utilities—Tacoma and Seattle Municipal Systems, Chelan and Snohomish Public Utility Districts, and Puget Sound Power and Light Co., has masterminded one of the boldest and most complicated plans the Northwest has yet seen.

Member companies of the Council plan to build a storage dam at Mica Creek on the upper reaches of the Columbia River in Canada and finance this with revenue bonds over a period of 50 years. The dam would even-out the flow of the Columbia between seasons, and between high and low water years.

The resulting control of the Columbia's flow would add 1,200,000 kw. to the generating capacity of Grand Coulee, Chief Joseph, McNary, Bonneville, The Dalles, and other downsteam dams. Roughly half the value of this added power would be credited to Council members, and half to BPA to cover the latter's cost of generation and transmission.

Mica Creek project would also permit generation of 900,000 kw. at the dam site. International discussions held so far would have the Council pay for the dam in return for downstream benefits, while Canadian interests would put in the power house at Mica Creek and keep the electric energy produced there.

At present, the problems raised by this project seem almost insurmountable. They are domestic, diplomatic, legal, monetary, etc. Decision must be made as to how charges will be handled for further downstream generation and transmission. And there is a question of who will put in the necessary additional generators downstream, including the long talked of third power house in Grand Coulee.

Besides this long range plan, the Council's job is to plan and integrate but not to build or operate. Its members are now working on nine projects for which preliminary permits have been granted or construction started. Most of these, like Tacoma's development now under way on the Cowlitz River, are entirely independent of federal funds. Together, these nine projects will produce 2,400,000 kw. more than the capacity of all the present federal generation on the Columbia.

Private power co-op

2. A second group, made up of five private power companies, which formed an informal joint venture over a year ago, have incorporated during the past six months to file application for permits to build two small dams on the Salmon River in Idaho. The permits, however, have since been withdrawn. The companies involved are Pacific Power and Light Co., Portland General Electric Co., Idaho Power Co., Washington Water Power Co., and Montana Power Co. The plans of this group are to build dams in the Pacific Northwest, taking up the federal government on its partnership offer.

Both this group and the Puget Sound Utilities Council have recently signed an agreement with the federal government to cooperate in future plans for development of electric power through steam plants run by atomic energy.

Governors committee

3. A third organization working for the solution of the Pacific Northwest's power problems is the Governor's Power Policy Committee, formed by the governors of Montana, Idaho, Washington, and Oregon. This group, divided into numerous subcommittees, is essentially a fact-finding body striving to solve the problems attendant to increasing the Northwest's hydroelectric power rather than building dams and generating power. It is concerned with the controversies between private and public power companies, with problems of fisheries, irrigation, navigation, etc.

The committee is undertaking studies and surveys to determine the amounts of power needed and the types of facilities in the Pacific Northwest that can best supply them. One of the chief concerns is the problem of downstream benefits. Every dam that is built has some effect on the storage area upstream and the flow into the storage areas and dams downstream. The Governors' Policy Committee tries to determine the dollar value to various parties from each particular dam. The question is who owes whom how much.

The Libby Dam project, proposed and endorsed by the Federal Power Commission, would consist of a dam near Libby, Mont., with the majority of its storage reservoir in Canada. The diplomatic problems in determining the project's value division between Canada and the U. S. are gigantic, to say nothing of the downstream benefits problem. An International Joint Commission has been formed (three men each from the U. S. and Canada) to try and iron out the differences. At the present time, the Commission seems a great distance from a conclusion suitable to both parties. It will have to come to an acceptable decision before any further considerations of dam sites, surveys, federal appropriations, licenses, and other necessary forerunners of actual construction and final production of hydroelectric power can even be considered.

Two further projects, long on the drafting boards of the Corps of Engineers, might well prove to be the solution to the Northwest's long-range power problems, since they can be put into effect relatively quickly and at present appear less complicated than either the Mica Creek or Libby, Mont., projects. These dam projects, both of which have been discussed and surveyed for some time, and both of which are opposed by wildlife and fisheries conservation groups, are Paradise Dam and the Glacier View Dam projects.

At present, the Northwest Power Pool can be divided into two groups, the western group covering Washington, most of Oregon, and the panhandle of Idaho, and the eastern group taking in the rest of the Pacific Northwest. The eastern group has satisfactory power capacity while the western group is feeling the pinch.

Mountain states

The following are the latest load estimates for Colorado, Wyoming, and New Mexico in megawatts:

Year	Colorado	Wyoming	New Mexico
1953	550	160	240
1954	604	170	275
1960	935	260	470
1970	1500	390	715

Western Outlook

ATOMIC ENERGY

Western utility companies join study projects of AEC to develop competitive nuclear power.

DEVELOPMENT of nuclear power occupies the center of attention, with a number of utility companies and others in the West engaged in study projects and a reactor under construction as part of the Atomic Energy Commission's program to develop competitive nuclear power.

Today's estimates of nuclear fuel costs run about two to three mills per kwh., of the same order as chemical fuel costs, but as reactor capital costs will be high, nuclear fuel will have to come down to one mill or less, according to C. G. Whelchel, chief of the division of steam engineering, Pacific Gas and Electric Co.

Western companies in the various study projects include the following:

Pacific Gas and Electric and Bechtel Corp. in the Nuclear Power Group.

California-Oregon Power Co. and San Diego Gas and Electric Co. in the Foster-Wheeler-Pioneer Service and Engineering-Diamond Alkali Co. team.

Pacific Northwest Power Co. of Spokane, which includes Montana Power Co., Washington Water Power Co., Pacific Power and Light Co., Portland General Electric Co., and Mountain States Power Co.

Rocky Mountain Nuclear Power Study Group, which includes Arizona Public Service Co., Fluor Corp., Idaho Power Co., Public Service Co. of Colorado, and Utah Power Co. This group will study at its own expense the economic possibilities of a nuclear power reactor for the Western United States, and AEC's Idaho Falls Operations Office will administer the agreement with the organization, which has established offices in Idaho Falls.

Denver & Rio Grande Western Railway Co. has been working for two years on the possibility of utilizing atomic energy in locomotives using electric power generated by diesel engines.

Hanford

For the first time since 1947, construction work is tapering off at the huge Hanford Operations Office of the Atomic Energy Commission. During 1955 two big construction projects will be finished and no new large-scale building programs are planned, according to the AEC.

When the present work is completed, the Hanford plant will represent an investment of about one billion dollars. This includes the plutonium-producing plants and the community of Richland, administrative and residential center for the workers and their families.

Kaiser Engineers Division of Henry J. Kaiser Co. is in final stages of a $110,000,000 building job for the AEC. The Kaiser force, which a year ago totaled 6,500 workers, is finishing a production facility.

Later in 1955 Blaw-Knox Co., Chemical Plants Division, will complete work on a $40,000,000 contract. This company started construction two years ago on a chemical processing plant which will become part of the Hanford operations.

At the beginning of 1955 Blaw-Knox had more than 3,000 workers on the payroll but the Kaiser force was rapidly dwindling.

There will always be minor construction on a project as large as the Hanford installation. However, the AEC anticipates that such a force will not exceed one thousand in the future unless a new major building program is authorized by Congress.

Along with the present construction phase the AEC has had some $30,000,000 worth of miscellaneous contracts for auxiliary plants.

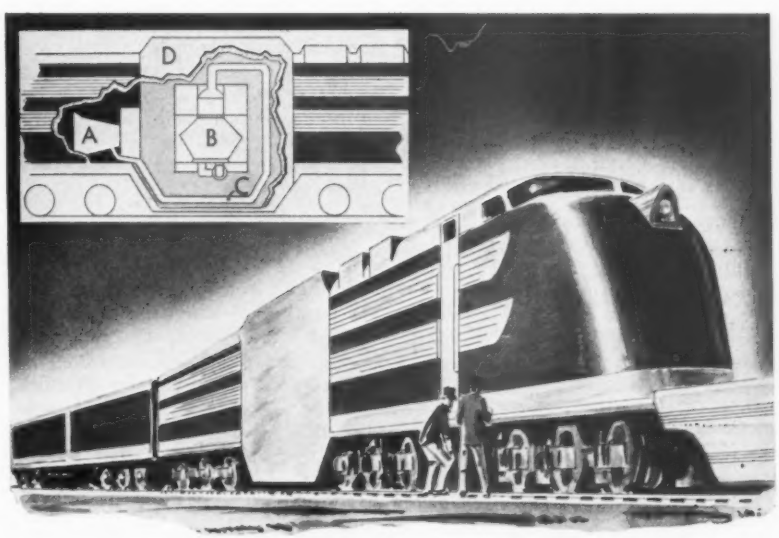
As the new facilities are completed they are turned over to General Electric Co., operating contractor at Hanford. GE now has about 9,000 on its permanent payroll and expects to add a few hundred more as the new plants are put into operation.

With its major construction program nearing an end, Hanford Works is assuming a permanent and vital part in the industrial economy of the Pacific Northwest. Along with Boeing and Puget Sound Naval Shipyard, Hanford is considered among the major payroll producers in the region.

Idaho Falls

Approximately $13,000,000 is being spent on construction projects at the National Reactor Testing Station at Idaho Falls, Idaho, in the period from July 1954 through June 1955, according to present plans.

This compares with about $8,000,000 spent on construction during the previous fiscal year (July 1953-June 1954). Construction on some of the projects will continue into the fiscal



ATOMIC-POWERED locomotive, designed by Dr. Lyle B. Borst, University of Utah nuclear physicist, resembles conventional locomotive except for 200-ton block in center containing the reactor (B). This heats water and sends steam through pipe (C) to the turbine (A). Steel block (D) has walls four feet thick to protect crew from radiation. Babcock and Wilcox Co., believing the design sound, is investigating heat transfer and boiler structure.

year beginning July 1955, but on a lesser scale.

Two major projects on which work is being done in the 1954-1955 fiscal year include continuation of construction of ground testing facilities related to development of nuclear power for aircraft and modifications to the chemical processing plant.

Idaho test area

A contract for more than $2,000,000 was awarded in April 1954 to the Arrington Construction Co., Idaho Falls, for construction of buildings and facilities for the initial engine test area of the aircraft project. The preceding year a contract of approximately $4,600,000 was awarded to Utah Construction Co., Salt Lake City, for the first phase of construction at the aircraft site, which included an administrative area and an assembly and maintenance area.

A $294,000 contract for construction of an exhaust system for the initial engine test area was awarded in September 1954 to Jacobsen Construction Co., Salt Lake City. The test facility will be operated by General Electric Co., which is carrying on research and development work at its Aircraft Nuclear Propulsion Department, Cincinnati, Ohio.

Construction of modifications to the chemical processing plant was begun in May 1954 by J. F. Pritchard and Co. of Kansas City, Mo. Engineering and design work was performed by the Blaw-Knox Co., Chemical Plants Division, of Pittsburgh, Pa. The plant, which is used in the reclamation of unburned uranium from used reactor fuel elements, is operated by Phillips Petroleum Co., Bartlesville, Okla.

In addition to these major projects, construction of a number of smaller miscellaneous facilities is underway, including a building to be used for gamma ray irradiations.

During 1954 arrangements were made for industrial and scientific institutions to make use of the materials testing reactor's intense neutron flux on work not connected with the Government's atomic energy program. For more than two years, this reactor has been affording AEC scientists and engineers the highest known neutron field in which to test various materials of interest in the design of new types of nuclear reactors. In addition to its testing work, the MTR, which is operated by Phillips Petroleum Co., can produce isotopes of higher specific radioactivity than other reactors.

Experimental operation of the prototype submarine thermal reactor was continued by the Westinghouse Electric Corp. The STR is the land-based model of the nuclear engine that will drive the first atomic submarine, the U.S.S. Nautilus, which was launched in January 1954 and commissioned later in the year. Construction is under way at the STR site on a modification of the spray pond, a cooling facility which dissipates heat generated by the reactor. A $224,000 contract for this work is held by Arrington Construction Co., Inc., Idaho Falls.

In experiments conducted at the National Reactor Testing Station during the summers of 1953 and 1954, Argonne National Laboratory developed much information on reactor operation through an experimental boiling water reactor. These experiments may have an important bearing on the safety of industrial power reactors.

Argonne also continued operation of the experimental breeder reactor, the first reactor to produce usable electricity and to demonstrate breeding. It is expected that this facility will continue making significant contributions in fast neutron reactor physics and radiation damage.

Los Alamos

The Los Alamos Scientific Laboratory in New Mexico made further progress in determining whether the free neutrino exists in nature; if so, the neutrino should be capable of causing the transmutation of free protons into free neutrons, accompanied by the creation of a positive electron (positron). First attempts to detect this event were made in 1953 at Hanford. The laboratory's facilities for measuring cross sections of concern to AEC's nuclear weapons and reactor programs approached the planned goal of having available sources of fast neutrons covering a wide range of energy.

Sodium reactor

AEC and North American Aviation are jointly financing a heat-only 20 mw. sodium graphite reactor near North American's field laboratory in the Santa Susana mountains 40 miles north of Los Angeles. North American is assuming 25% of the $10,000,000 cost involved.

This reactor is expected to be in operation in the early part of 1956. It includes heat transfer systems, fuel handling system, and instrumentation and control systems, but not the conventional parts of an electric generating plant, the steam and turbo-generator unit.

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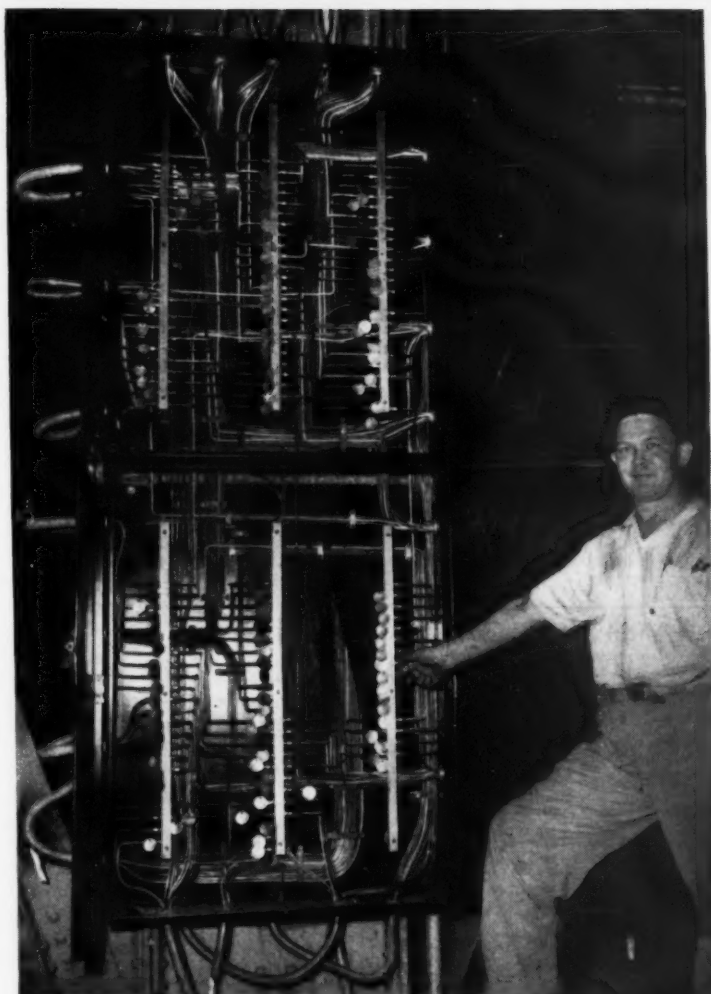

Some time ago Revere ran an advertisement featuring Crescent Armored Multitube for use in pneumatic and hydraulic instrumentation and control systems. The advertisement created so much interest that we thought you might like to see a photograph of an actual installation. The Control Board Junction Box shown here has 22 runs of Multitube coming into this box comprising 224 Revere Copper Tubes of 1/4" O.D. The picture was taken in the Glenwood Landing, N.Y. Power Station of the Long Island Lighting Company. The tubes go to instruments that report information on temperature, main and reheat steam pressure, boiler feed and condensate pump pressure, fuel oil and gas pressure, liquid levels, tide level and for the control of fuel feed, draft dampers, boiler drum water level and various control valves.

This is a relatively new use for Revere Copper Tube, but it is an important one in these days when new ways are being found to obtain process information more quickly and accurately, or to achieve automatic control. Crescent Armored Multitube is made by Crescent Insulated Wire & Cable Co., Inc., Trenton 5, N.J., in lengths up to 1,000 feet. It consists of a group of long tubes twisted together in cable form, protected by a flexible interlocked galvanized steel armor, or by plastic, or both. As many as 19 tubes, 1/4" O.D., can be cabled, with one tube in each layer color-coded. Larger tubes can also be cabled, including 5/16", 3/8" and 1/2". This construction affords protection during shipment, installation and use, and speeds up installation greatly. For further information, write Crescent, and for tube in copper and aluminum, see the nearest Revere Sales Office.

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Control Junction Box at Power Station of Long Island Lighting Company, showing use of Crescent Armored Multitube. Note that relatively sharp bends can be made without damage to the cabled copper tube.

Construction of Crescent Armored Multitube.

Western Outlook

STEEL

Demand holds up better in 1954 in the West than the nation as a whole. Outlook for 1955 is good.

GENERAL improvement in business conditions in the latter part of 1954 was reflected in Western steel mill operations, and a high level of output is expected to continue in 1955.

Consumption in the West for 1954 is estimated as about equal to 1952, and Western demand did not decline as much as the nation as a whole. Demand for some products exceeds local availability, according to Alden G. Roach, president of U. S. Steel's Columbia-Geneva division. Also, large tonnages of steel consumed in 1954 came from inventories in the hands of steel users, he said, and these have been reduced to a minimum, which means that increased steel supplies will be required in 1955 to meet new manufacturing needs as they develop.

Western steel mills operated at 76% of capacity for the first 11 months of 1954, as against a national average of 70.3%. Figuring the average production of the three years 1947 through 1949 as 100, the 11-months period for 1954 ranked as 120.5%, while the national average was 104.4%.

The Western output was 4,885,484 tons for the 11 months, while capacity as of January 1, 1954, was 6,422,470 tons.

Bethlehem-Pacific Coast Steel Corporation completed in the spring expansion and modernization of its Los Angeles facilities, increasing ingot capacity from 100,000 to 400,000 tons, adding a high speed bar and rod mill and enlarging its bolt and nut capacity. This was the completion of a program begun in 1946. At the end of the year construction was begun of a new fabricating works in Torrance, replacing the present fabricating works.

In the fall Consolidated-Western Steel Division of U. S. Steel began construction of a steel pipe manufacturing plant adjacent to the Geneva, Utah mill, replacing line pipe facilities at South San Francisco, Berkeley, and Los Angeles. This plant is located in the hub of a wide area of demand for electric weld pipe used for transmitting natural gas, petroleum products and water. It will have about five acres under roof. Space vacated at Los Angeles will be used for expanded operations in the fabrication of special projects.

The pressure to develop more iron ore in the West is indicated by the fact that U.S. Steel has filed 119 claims on 1,740 acres of land near the Kaiser iron mines in Riverside County and is in litigation with Kaiser on the ground that the latter has jumped the claims. Whether this ore, when developed, will be hauled clear to Utah or will have to be converted into steel in Southern California remains to be seen.

About 2,500,000 tons of products employing steel in their manufacture are being shipped into the Western states each year from the East and Midwest, and Western manufacturers are in line to get an increasing amount of this business.

Role of warehouses

Steel warehouses play a larger part in distribution in the West than elsewhere, due largely to the fact that most of the Western steel consumers are job shops of comparatively small size and therefore unable to plan their operations so as to buy in mill quantities.

A survey by Kaiser Steel Corp. indicates the approximate proportion of the total 1953 steel receipts in seven Western states for warehouse stock replacement as 25% of the total, compared to the national average of 18%.

Western market breakdown

General Planning Department, Kaiser Steel Corporation
(in thousands of net tons)

Steel mill product	Total, 7 Western states		Southern California		Northern California		Oregon, Washington		Ariz., Utah, Nev., Idaho	
	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953
Plates										
Sheared plates	905	1,057	311	442	434	428	90	105	70	82
Universal mill plate	34	51	14	14	10	17	8	16	2	4
Structural shapes										
Wide flange beams	120	191	45	71	46	63	17	36	12	21
Standard structural shapes	294	353	110	136	94	96	59	81	31	40
Hot rolled bars and bar size shapes										
Carbon	490	507	227	220	150	128	95	121	18	38
Alloy	83		67		9		6		1	
Concrete reinforcing	457	396	151	142	155	118	128	102	23	34
Hot rolled sheets	402	529	227	281	145	186	25	44	5	18
Hot rolled strip	50	64	27	39	15	15	7	7	1	3
Cold rolled sheets	206	255	130	156	60	75	14	20	7	4
Cold rolled strip	62		45		15		2			
Standard and line pipe										
Pipe 4 in. and under	288	346	156	193	90	81	25	40	17	32
5-12¾ in.	187	184	100	96	50	34	17	33	20	21
Tin mill products	867	895	165	176	538	557	147	144	17	18
Galvanized sheets	149	218	63	98	60	61	22	43	4	16
All other mill products	821	1,124	389	504	235	318	132	105	65	197
Gross total	5,415	6,316	2,227	2,669	2,106	2,206	794	909	288	532
Adjustment for conversion	168*	237*								
Net total	5,347	6,079								
Percent of total Western market		100%		42%		35%		14%		9%

*Steel mill products received by consumers and converted into other mill products are subtracted from total to avoid duplication.

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Western Outlook

ALUMINUM

Shipments up 100% since 1946. Continued expansion planned in Canada. Production up for 1954.

ALUMINUM production in 1954 for the Pacific Northwest was about 485,000 tons, as compared with 477,000 tons in 1953. Water conditions during 1954 were fairly good and the industry was able to secure continuous power on an interruptible basis throughout the year. In 1953 interruptible and part of the firm loads were curtailed for a period of two weeks early in the year.

Probably the most important factor in the industry remains the increasing availability of primary aluminum to fabricators. The Aluminum Co. of Canada plant at Kitimat, B. C., has started up with a reported initial annual capacity of 91,000 tons and work is underway to up the capacity 65% more. If the market continues to expand, plans are for an ultimate capacity of 550,000 tons per year.

In the eleven Western states total shipments of all aluminum products during 1954 reached an estimated 472,000,000 lb. It is a gain of approximately 100% over 1946. More than 15% of the West's production is going to the Western states.

Primary capacity in the Northwest, including expansions of Alcoa at Wenatchee and Reynolds at Longview, totaled 940,000,000 lb./yr. Kaiser Aluminum & Chemical Corp reduction plants at Tacoma and Mead have a total rated annual capacity of over 400,000,000 lb. Anaconda is scheduled to complete a 104,000,000-lb. capacity reduction plant at Columbia Falls in 1955. Harvey's 108,000,000-lb. plant at The Dalles is still up in the air.

Continental capacity

Total domestic primary capacity—excluding Kitimat— is approximately 2.8 billion lb. Total North American continent primary capacity has now reached 3.9 billion lb., and long range expansion programs in Canada will eventually bring the continental total to nearly 5 billion lb. annually. This does not include secondary capacity.

In the Pacific Northwest, there are now more than 500 independent aluminum fabricators. Including the aircraft industry and the growth of fabricating facilities in the Southern California and Arizona areas, the Western states probably have several thousand fabricators.

Major producers have announced various expansions of fabricating facilities during the year. To its Western facilities, Kaiser Aluminum is completing a $1,500,000 expansion at Trentwood, adding a 3,000-ft.-per-minute, 60-in., four-high cold rolling mill, and a 72-in. embossing mill to increase light-gage sheet and wide-embossed sheet capacity by 36,000,000 lb. annually; a new 60-in., four-high foil rolling mill at Permanente to turn out 6,000,000 lb. of wide foil.

Alcoa

The latest boost to the Pacific Northwest aluminum manufacturing firms is the availability of a great variety of extruded shapes from Aluminum Co. of America's new Vancouver, Wash., extrusion mill — the Northwest's first major extrusion operation.

The new installation topped off a $6,700,000 fabricating expansion program. The mill went into official production in October 1954. Alcoa can now smelt, alloy, cast, and extrude metal at the Vancouver plant. Extrusions produced will be used extensively in the Northwest's architectural construction, transportation equipment, and agriculture and irrigation equipment industries.

Additional phases of the Alcoa fabricating expansion included completion of an addition to the plant's rod, wire, and conductor cable mill. New equipment included wire drawing machines and cable stranders.

The third phase of the project was an ingot casting addition, which houses facilities for casting extrusion and sheet ingot.

Meanwhile, smelting production at Alcoa's Vancouver and Wenatchee plants held up well in 1954 and Alcoa officials indicated no power cutbacks were expected this winter. Installed capacity of the two plants is about 340,000,000 lb. of aluminum annually.

No third round

The industry's so-called "second-round" expansion is now complete. After reappraising its present and future needs, the Department of Defense finally abandoned its planned third round of expension which would have added about 400,000,000 additional pounds to the nation's annual primary aluminum capacity.

Shipments of semifabricated aluminum products, which had shown a considerable drop during the latter part of 1953 and early 1954, registered a substantial recovery beginning in the second quarter so that the average shipments of the various products during the later months of the year compared favorably with the averages for the corresponding months of 1953. Aluminum foil was a notable exception, advancing to new monthly shipment totals several times during the year. Increased use of foil is attributed to its wider use as a packaging material and for other industrial purposes.

Following another round of wage increases to aluminum industry workers, price advances both in primary metal and semifabricated mill products became necessary. Aluminum pig was advanced 0.5c a pound to 20.5c and ingot 0.7c a pound to 22.2c. Prices of most fabricated aluminum products were increased proportionally.

To eliminate the confusion resulting from the use of the many alloy designation systems that have been introduced from time to time as the industry grew, The Aluminum Association introduced a new system for wrought alloys which offers uniform designations for the entire industry. The new system is expected eventually to eliminate the confusion and should thus prove a boon to users and producers alike.

Several new aluminum alloys were introduced during the year. These included: alloy 5086, a non-heat-treatable alloy designed especially for weldability and adaptability to structural applications; alloy X7079, a high-strength alloy developed especially for large aircraft forgings; and an electric conductor alloy with superior mechanical properties which are obtained at a slight sacrifice in electrical conductivity.

A considerable amount of new fabricating equipment was installed in 1954. Other units were under construction at year end and still others in the planning stage. A 14,000-ton extrusion press, largest built to date, went into operation during the second quarter. Two 2,500-ton extrusion presses went into operation in the Pa-

cific Northwest, and two new sheet rolling mills are being added at one of the plants in that area. Three more large forging presses are scheduled for the Los Angeles area.

Some of the most outstanding developments in the use of aluminum during 1954 were in the building field. Use of aluminum in trucks and busses continued on a high level and its use in automobiles showed substantial increases. One reason for the increased use in automobiles is the growth of automatic transmissions, as aluminum is well adapted for the economical production of the complicated parts of these units. The metal also is being used increasingly for engine parts and in fittings, particularly in die castings where aluminum offers the lowest metal cost of any of the common die casting alloys.

The economic advantages of aluminum as an electric conductor brought an expanded use in this field during the year. While maintaining its long held supremacy on high-voltage lines, aluminum conductors are now being used increasingly on lower voltage circuits, including building wiring. The use of aluminum conductors in telephone cable also increased.

Western Outlook

COPPER

Three new plants started to treat low-grade ore in Ariz. Western production is down.

HIGHLIGHT of the Western copper mining industry in 1954 was the starting of three new flotation plants to treat low-grade open pit porphyry copper ores. In order of first operation, they were:

The Silver Bell mine of the American Smelting & Refining Co. north of Tucson, Ariz., in April. The 7,500-ton-per-day mill has a rated equivalent production of 1,500 tons per month.

Second was the Lavender pit of Phelps Dodge Corp. at Bisbee, Ariz. This 12,000-ton-per-day unit started in July and produces about 1,900 tons of copper per month.

The third mine, which reached full production ahead of schedule on November 1, is the Copper Cities near Globe, Ariz., operated by Miami Copper Co.'s wholly owned subsidiary, Copper Cities Mining Co. The supply of new copper will not be affected by this last mine, as it replaces output from the nearby depleted Castle Dome ore body.

Kennecott's Deep Ruth underground block caving project at Ruth, Nev., has been delayed by water, and first ore production is scheduled for 1955.

San Manuel Copper Co., San Manuel, Ariz., largest of the new porphyries, with all mining done by block caving, is not scheduled for production until 1956. However, rapid progress was made on mine development, flotation mill, and smelter construction during the year.

From a production standpoint Western copper output is down from 885,174 tons in 1953 to an estimated 800,000 tons in 1954. Reasons are twofold: first, curtailment of production by the larger producers during the early part of the year when many important mines were operated only on a five-day-per-week basis; and secondly, by a series of crippling labor strikes which began in August and continued at some mines until October.

Preliminary production estimates indicate that Nevada apparently surpassed both Montana and New Mexico and became the nation's third most important copper producing state in 1954. This is largely due to the expanded and regular output of the Yerington mine of Anaconda Copper Mining Co. at Weed Heights, Nev., which was placed in operation on November 11, 1953, and hit capacity in 1954.

The major companies made it a policy during the year for individual workmen to work only five days a week and to hire additional men for any other production.

The price for copper was unchanged at 30c per pound, electrolytic, delivered to Connecticut Valley points durthe year. This is unusual and indicated the desires of the copper industry to increase supply and stabilize the price which is of great value to consumers.

Western Outlook

MAGNESIUM

Consumption of alloy ingots for aircraft plants remains about the same as for 1953.

CONSUMPTION of magnesium alloy ingots for castings during the first three quarters of 1954 was approximately the same as for a comparable period in 1953. Magnesium fabrication on the West Coast is limited to casting operations. Sheet magnesium and all extrusions are supplied by Eastern sources. Magnesium castings are supplied by 14 West Coast sand foundries, three permanent mould foundries, four die casters, and one investment caster.

Western Outlook

URANIUM

New discoveries on Colorado Plateau pave way for seven uranium mill expansions.

TO MEET the need for additional uranium ore processing facilities in 1954 as a result of the discovery and development of several large ore bodies on the Colorado Plateau and surrounding areas, a total of seven expansions at the existing eight processing mills and the opening of a new mill were announced during the last eight months of 1954.

With the completion of a new mill at Shiprock, N. M., by Kerr-McGee Oil Industries, Inc., in November, a total of nine processing mills were operating at the year's end and negotiations for a tenth mill at Moab, Utah, were nearing the signing stage.

Output mounts

More uranium ore was produced in the Colorado Plateau in the first six months of 1954 than in the entire year of 1952. Explorational drilling conducted under the auspices of the Atomic Energy Commission in the fiscal year 1954 amounted to 1,222,000 ft., but private industry did still more, or about 2,500,000 ft. The AEC expects this ratio of 2½ to 1 to increase still further as mining men get their programs under way. The number of producing mines increased from 629 in June 1953 to 795 a year later.

All of the uranium processing mills in this area except one are owned and operated by private industry under the terms of individual contracts negotiated with the Grand Junction Operations Office of the Commission at Grand Junction, Colo., of which Sheldon P. Wimpfen is manager. The one government-owned processing mill is at Monticello, Utah.

In addition to the milling expansion program which has been under way for the past several months, the Commission completed the construction of additional pilot plant facilities for treating uranium-bearing ores at the Grand Junction Operations Office which incorporate equipment for treating ores by both acid and carbonate leaching processes.

The objective of the pilot plant program is to employ improved processes for the treatment of uranium-bearing ores to solve metallurgical problems related to obtaining improved recov-

ery with greater efficiency, and the milling of refractory ores with the equipment of a size that may be scaled up for application in full-scale plant operations. The Grand Junction pilot plant is operated under the Commission's Raw Materials development laboratory at Winchester, Mass.

The nine uranium ore processing plants and the operators are as follows:

Rifle, Colo.: U. S. Vanadium Co.
Uravan, Colo.: U.S. Vanadium Co.
Durango, Colo.: Vanadium Corp. of America
Naturita, Colo.: Vanadium Corp. of America
Salt Lake City, Utah.: Vitro Uranium Co.
Grants, N.M.: Anaconda Copper Mining Co.
Grand Junction, Colo.: Climax Uranium Co.
Shiprock, N.M.: Kerr-McGee Oil Industries, Inc.
Monticello, Utah: Plant owned by government and operated under contract by the Galigher Co., Salt Lake City

Announcements of plant expansions made by the AEC or contractors in the last eight months of 1954 included:

1. *Grants, N. M.:* Announcement was made on May 18 that Anaconda and the Commission had signed a contract for expanding plant facilities as the result of discovery of new and large bodies of uranium-bearing ores in the Morrison formation of that area. Less than four months later—on September 15, 1954—additional ore discoveries brought another contract with the Commission for expanding the Grants plant further.

2. *Salt Lake City:* On May 20, 1954, the Vitro Uranium Co., Salt Lake City, Utah, and the Commission signed a contract for substantial increase in the capacity of the uranium processing plant at Salt Lake City.

3. *Durango, Colo.:* In June 1954 the Vanadium Corp. of America and the Commission executed an agreement for a substantial increase in the capacity of VCA's Durango plant.

4. *Grand Junction:* On October 25, 1954, Climax Uranium, a subsidiary of Climax Molybdenum, and the Commission jointly announced the signing of a contract for the expansion of the Grand Junction processing plant operated by Climax.

5. *Monticello, Utah:* On May 5, 1954, the Commission announced a projected expansion of the Government-owned plant at Monticello to provide facilities for treating large tonnages of widely varying types of uranium ores that had accumulated as a result of the Commission's willingness to provide a market for ores other than those of the carnotite-roscoelite type.

The complex and difficult to treat ores have been purchased and stockpiled at Monticello to encourage uranium miners to find and mine more tons of uranium ore. This plant is operated for the Commission by The Galigher Co. of Salt Lake City. This company also was awarded the contract for the design of the additional plant facilities, and the H. K. Ferguson Co. of Cleveland, Ohio, was selected from some 25 companies who submitted proposals to perform the construction. Work was scheduled to start in late December of 1954 or January of 1955.

6. *Naturita, Colo.:* On November 30 the Vanadium Corp. of America and the Commission announced signing of a contract for expanding the capacity of VCA's Naturita, Colo., processing plant.

7. *Shiprock, N. M.:* Under the terms of the contract with AEC, Kerr-McGee began construction of the Shiprock plant in August of 1953 and completed it by the end of September of 1954. Several months before the plant was completed, however, increased supplies of uranium-bearing ores indicated that a larger capacity plant would be needed. Negotiations between the Commission and Kerr-McGee culminated in the signing of a contract objective to achieve this after the plant was opened on November 1.

In addition to the proposed processing plant at Moab, Utah, the Commission has received proposals for the erection and operation of processing plants at other locations in the Western states. In furtherance of its program to provide adequate milling facilities, the Commission is expediting the review of such proposals.

Western Outlook

MINING

Uranium mining continues to run full blast while other mining phases are lagging.

ALTHOUGH uranium mining is going hot and heavy, some other phases of mining have lagged. Zinc production in the West was only 174,877 tons for the first nine months of 1954, as against 547,430 tons for 1953. Consumption in eight of the eleven Western states for 1953 was 51,304 tons, about 12% above 1952.

Lead also suffered a decline. Arizona's output for 1954 is reported at less than 9,000 tons, compared with 9,428 tons in 1953 and an annual average of 27,162 tons from 1947 to 1951. Despite the government's stockpiling policy, lead and zinc prices are still too low to permit reopening many mines.

The longest underground conveyor system in the country is to be installed at Potash Co. of America's mine at Carlsbad, N. M.

Western Outlook

COAL

Competing fuels cut markets. Production fell off in 1954. More steel to help.

LAST year was not a good one for the Intermountain coal industry, which is centered in Utah, Wyoming, and Colorado.

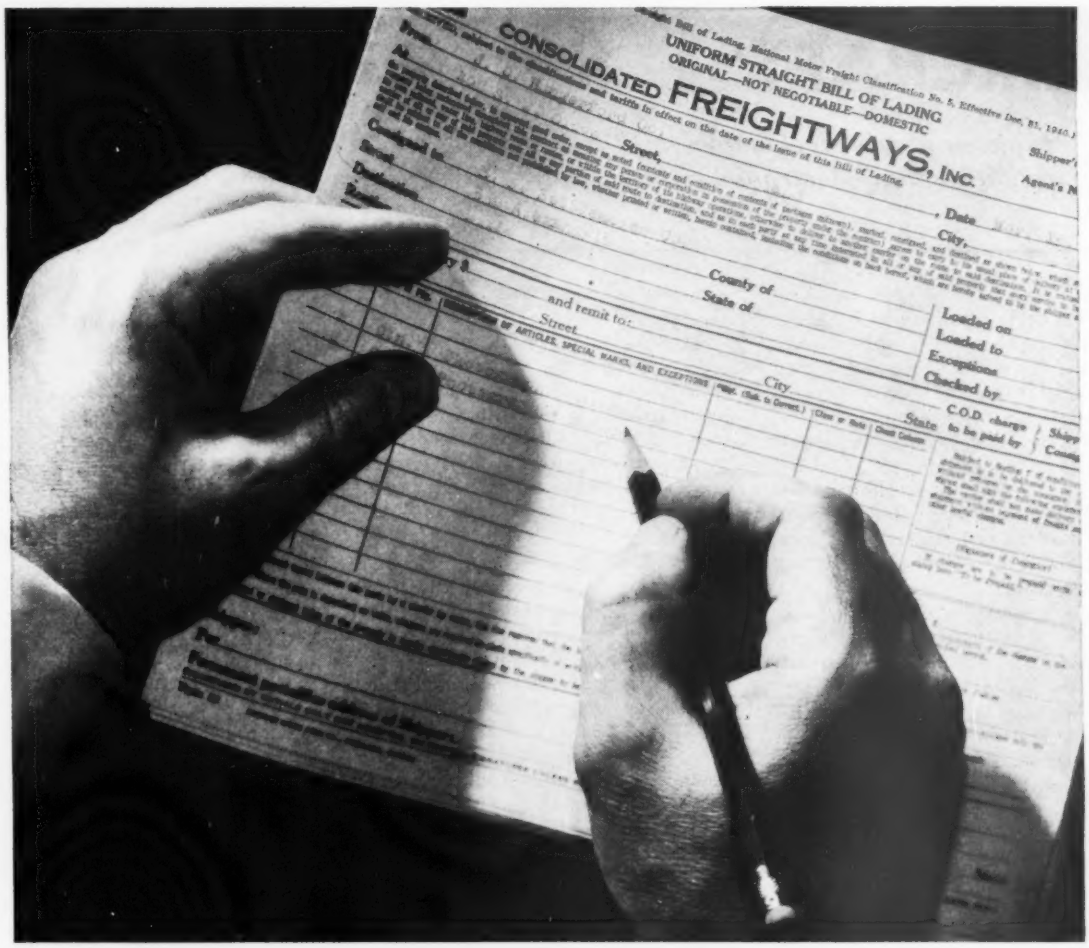
Depressing factors were mild winter weather, new encroachments of natural gas, and a reduced level of steel production.

The 1954 production in Utah was slightly less than 5,000,000 tons, down more than 20% from the 1953 production. The decline was even steeper in Wyoming and Colorado. In Wyoming the Union Pacific Railroad mines in the Rock Springs area, major producers, were closed. This resulted in cutting production by more than one-half as compared to the previous year.

The outlook for 1955 is for a moderate upturn in production. A higher level of steel production is anticipated by most forecasters, which should increase production of the captive mines. In Utah the industry will gain a new market for some 600,000 to 700,000 tons for electrical power production. During 1954 approximately that amount of power consumption was lost to competing fuels. The new market will be the Utah Power and Light Co.'s new plant at a Carbon County coal mine tipple.

Additional natural gas encroachments into the coal industry's market are in the works, but because of time-consuming hearings and other factors, little displacement is expected from that source during 1955. Some cold weather would also boost production. And the present outlook is that the industry will get more export business in 1955 than it got in 1954.

About 25% of Japan and Korea's requirements for steam coal have been supplied through West Coast ports, and Western coal operators feel they should get more of this business, since it takes ten days longer to reach these markets from Eastern Gulf ports. Korea alone uses 1,000,000 tons a year.



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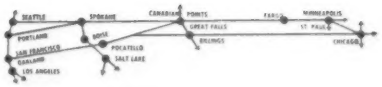

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Western Outlook

AIRCRAFT

Major emphasis on chemical milling, adhesives, weight-saving, electronic circuits, and steels.

AIRCRAFT, the West's mightiest industry, continues its quest for materials, processes, and equipment that will allow the building of lighter, stronger aircraft to travel at even higher speeds and temperatures.

WESTERN INDUSTRY has completed a special survey of aircraft manufacturers in the West in an effort to find out the primary trends of the industry as well as the new materials, applications, and processes developed during the past year.

From a careful analysis of the programs of these major manufacturers, it appears that certain primary trends are becoming evident:

1. Continuing search and experimentation in the realm of high heat treat steels (260,000 to 280,000 psi.).
2. Use of chemical milling to inexpensively remove large volumes of unwanted metal.
3. Further development of titanium and titanium alloys for jet aircraft.
4. Experimentation on forming, welding, and machining of high temperature materials.
5. Use of printed and electronically etched circuit boards.
6. Lightweight honeycombs of fiber and metal for structural lightness.
7. Fabrication and assembly of large, tapered stainless steel pieces.
8. New silicone rubber additives to improve the rubber's flame resistance.
9. Use of sintered metals: stretch forming; and shell moulding.
10. Increased use of compression forming of metal parts.
11. Development of lighter structural materials to withstand higher skin temperatures.
12. Plastics-to-metal bonding; new alloys of heat resistant metals; and continued development of high temperature ceramic coatings.

WESTERN INDUSTRY'S survey further indicates that manufacturers of aircraft and aircraft components are increasingly more concerned with diversified research and development programs geared to the aircraft of the future.

The following results, by individual manufacturers, indicate the latest in materials, methods, and equipment, as well as more intensive utilization of already known materials and processes. They were compiled from replies to WESTERN INDUSTRY'S survey.

Boeing

Use of adhesives for making metal-to-metal bonds has received increased emphasis, and a process has been worked out for using an adhesive developed by Shell Chemical Corp., for use at high temperatures. A synthetic rubber formulation has been developed that appears to be the equivalent to the Buna-N type rubbers in fuel resistance, to neoprenes in heat and weather resistance, and to the silicone rubbers in low temperature resistance.

Another feature of the material is that plasticizers are not required to gain low temperature resistance. These characteristics insure material that shows virtually no decrease in volume from fuel extraction and its low temperature resistance properties are retained after fuel immersion followed by drying.

Lack of flame resistance which has curtailed use of silicone rubbers in certain applications has been markedly improved through the discovery of two new additives. This new combination produces a compound that is self-extinguishing after being subjected to a 2,000 deg. F. flame for 20 seconds.

A new method of testing fillets of elastomeric sealing materials has been developed. It is called dynamic testing and utilizes temperature, frequency, deflection, and any kind of pre-conditioning desired for the sealant. A tester can simulate most service conditions.

Convair

High strength steel extrusions and new high strength aluminum extrusion alloys, both developed by Harvey Machine Co., Torrance, have become important during the last year. Foamed-in-place plastics have become of greater interest to both structural and electronic designers, while the development of epoxy resins has continued at rapid pace. One of the most interesting of these items is glass-epoxy resin laminate for electronic items such as terminal boards and printed circuits. It has excellent electrical properties and is resistant to moisture and fungus, but is difficult to punch small holes through.

Steel extrusions save both material and machining time since they closely approximate the desired final shape. However, die life is short, and present commercial supply of these extrusions is limited. The new aluminum alloys offer greater strength than many conventional alloys, but are not yet covered by government specification.

Foamed-in-place plastics are finding wide usage for encapsulation of electronic components to afford protection against moisture, shock, and vibration. However, the foaming agent is frequently irritating to personnel and must be handled carefully.

Other new materials finding acceptance during 1954 include weldable titanium alloys and porous sintered stainless steel for anti-icing applications. These enjoy the advantages of high strength to weight ratio, good strength at elevated temperatures, and excellent corrosion resistance. On the other hand, titanium will cause corrosion when in contact with anodic materials; its elongation is not uniform; the ratio of tension to shear in spot welds is low, and the material is difficult to drill and tap.

Several Western foundries are now offering castings made in shell molds. These castings have a smoother finish and closer dimensional tolerances than sand castings.

Among new developments in materials already used by the industry, Convair cites the following:

1. Application of sandwich construction to primary structure.
2. Heat treating of steel to 280,000 psi.
3. Use of titanium for fasteners.
4. Adhesives for fuel tank sealing.
5. Heavy press forgings of large size.
6. Titanium extrusions.
7. Adhesive bonded primary structures.
8. Titanium forgings.
9. Heat-treatable titanium alloys.
10. Potted electrical plugs.
11. Metlbonded stainless steel sandwich.
12. Use of no-draft forgings.
13. New steel extrusions.

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A specific application for chemical milling has been developed for the forming of large diameter thin wall aluminum alloy tubing (not commercially available). Tubing of the required size cannot be readily bent to form because of the limitations of wall thickness. Convair now uses available standard size tubing and removes material to required wall thickness after forming.

Another application of chemical milling can be found on forgings and extrusions. The thickness of certain webs and sections is determined by the nature of the process. Machining these sections for reduction of thickness is usually an expensive process requiring unusual set-ups.

Using chemical milling it is possible to design forgings and extrusions with prescribed wall or web thickness and calculate the amount of material to be removed on thin wall sections to meet design requirements. This is done by adding the same amount to the heavier remaining sections and then specifying chemical milling to meet the finished dimension requirements.

Many hours of die finishing have been saved by the use of epoxy resins for stretch forms and die facings. Most important use is on forming a difficult engine cowling of stainless steel. A flexible plastic snake is used during the stretch forming to hold out wrinkles and a plastic faced die and punch are used in the drop hammer operation.

COMPONENTS THE WEST SHOULD BUILD

Convair

Convair would like to see West Coast manufacturers produce air bottles, electronic tubes, precision timers, capacitors, and resistors. These five items are the most troublesome to procure at the present time. There are no satisfactory Pacific Coast sources available for production quantities.

Fletcher

The West needs to improve the quality of aircraft forgings and castings.

Lear

Lear would like to be able to buy ceramic components, more basic copper wire, carbon resistors, magnetic ferrite products, jeweled bearings, variable condensers, and 5-10-20% potentiometers. They would like to see resistors produced on the Coast, more competition in the tube socket and connector field, and better sources for hookup wire.

Lockheed

Lockheed would find it most convenient to have all its suppliers of materials and components on the Pacific Coast, thus minimizing difficulties of communications and deliveries.

Marquardt

Highly intricate castings in small quantities in the newer alloys of aluminum and magnesium are a continuing procurement problem. There is need of a source of fabricated honeycomb shapes with double curvature and a useful temperature range to 1,800 deg. F. A local source of 360 deg. stretch-forming of extruded shapes is also needed.

North American

Local availability of a Keller machine capacity would be advantageous since most shops equipped with Kellers are located in the Midwest and East.

Northrop

Among the parts Northrop would like to buy on the Pacific Coast are: heavy conventional aluminum forgings, large no-draft forgings, constant speed alternator drives, oxygen cylinders and regulators, fuel booster pumps, vibration isolators and mounting bases, bearings, glass windshields, vent assemblies, high precision resistors, potentiometers, relays, some capacitors, transducers, gyros, and glass-melamine terminal boards.

Ryan

Among those components currently being bought in the East, Ryan would like to see steel extrusions, flash-butt welded jet engine rings, close tolerance stainless steel foil, and tapered, stainless steel sheet stock produced on the Pacific Coast.

Solar

Items now being manufactured in the East and Midwest that should be made available on the Pacific Coast include high quality fuel pumps, generators, instruments, and controls.

A new technique for using kirksite to replace steel as die material for a punch press operation on light-gage metal and plastic has resulted in a tool life increase of over 500%. In addition, deburring is eliminated on .020 in. magnesium and 24SO aluminum and .032 in. plastics.

To set up the die, the tool is run alone through the kirksite, automatically cutting the die hole to the proper size for subsequent clean, sharp punching operations. The kirksite may be used again when worn out by simply increasing the size of the punch.

An octopus type vacuum chuck has been developed for holding skins during milling operations. This allows any shape of skin to be placed on the chuck without complicated sealing off of exposed vacuum sources, necessary in some types of chucks. Approximately 1,000 suction cups can be used during milling operations.

A machine has been devised (in addition to the development of the Straylor-type rivet) to form and assemble the washer to the rivet simultaneously. The washer material is fed to the machine in ribbon form. The rivet shank acts as the punch to form the inside diameter of the washer in the first operation. A continuation of the stroke forms the outside diameter, with the rivet head acting as the shear. The finished rivet and washer assembly drops into a container in the final stage. This machine has resulted in a 61% manpower saving.

Convair has given new life to an old Morey profiler machine by installing a true-trace hydraulic valve. The valve eliminates the rough sawing operation and results in a finished job in 11 minutes. Previously, the job took one hour and 12 minutes. The operator follows a template with a valve stylus and hydraulically translates the template configuration to the work table.

Considerable development is being done in the use of plastics and metl-bonding. This medium is attractive from a weight as well as a cost-saving standpoint. Although new applications are continually being presented, their use for hot forming dies is greatly retarded by the lack of resins having the required characteristics of heat resistance and toughness.

The use of internal chrome plating of blind chambers in aluminum, to precision limits, has been found to require only light honing to inside diameter tolerance. Electronically etched circuit boards, plated over formed edges and through holes to

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and see functional, durable, BRASS at work

In adding a combination steam-and-dry iron to its list of electrical appliances, The Dominion Electric Corp., Mansfield, Ohio, set its goals high. The iron had to be engineered, styled and priced so as to be readily salable in a highly competitive market.

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2 The iron *must* be light in weight (actually 3¼ lb.) and provide a long service life.

3 It *must* operate unfailingly – anywhere – on ordinary, undistilled tap water.

For the housing, steam generator, filler tube and miscellaneous supporting members, BRASS was the answer – as it so often is where freedom from rust, resistance to corrosion, workability and ease-of-finishing must be coupled with moderate cost.

We are glad to report that Dominion's choice and extensive use of Anaconda Brass paid off handsomely; also that we were able to give their engineering and production staffs an assist in selecting the right compositions and the most economical gages and tempers. Perhaps we can do the same for you? Simply write The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 5489

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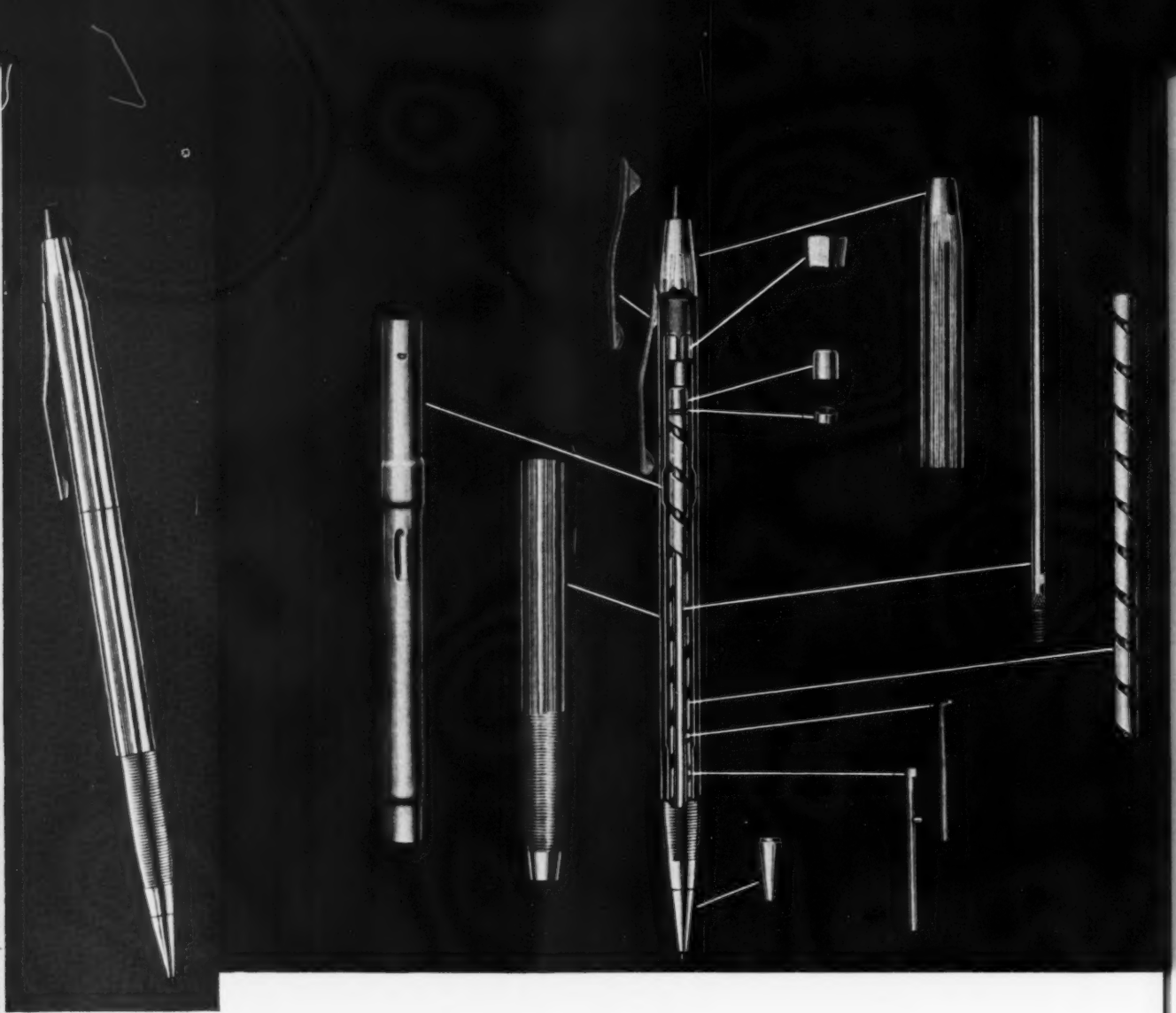


CROSS put an end to automatic pencil troubles **with BRASS**

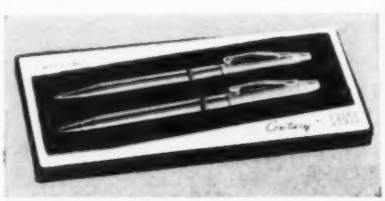
Since 'way back in 1846, America's oldest manufacturer of fine writing instruments—the A. T. Cross Pencil Company, Providence, R. I.—found out that you can do things with brass that you can't do with any other metal. And they've been doing it ever since.

Illustrated above in actual size are an even dozen parts that make up the chromium plated Cross Pencil. All, except the spring clip of phosphor bronze, are made of brass supplied as sheet, strip, wire, rod or tube.

Note the multiplicity of fabricating operations—from the free cutting brass point to the strip-wound spiral—and you'll come to the conclusion that brass gives you the most "easy workability" for your money.

And the man who owns a Cross Pencil—or Pen—is far less apt to fume or fuss. He's got a writing instrument that's tops in quality at a moderate price, with parts that resist wear and corrosion . . . that won't rust, gall or "freeze."

Dependable brass is plentiful—and unrestricted. The days of substitutes are over. Next time the man at the drawing board looks up and says "What'll it be," say "Make it brass." Better yet, say "Anaconda Brass." The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.



In the exploded view, above, is featured the pencil of the A. T. Cross Chromium Plated Pen and Pencil Set. All parts, including those in the pen, are made of Anaconda Alloys supplied by The American Brass Company since 1913. Cross also uses the same "inside working parts" in two "Century" Pen and Pencil Sets in which the caps, barrels and clips are available in either sterling silver or 1/20 12K gold-filled (illustrated above).

ANACONDA

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connect circuits on both faces, with neither eyelets nor other appliances, are coming into general acceptance.

The first film-controlled drivematic rivet machine, developed by Convair in conjunction with General Riveters, Inc., is now in operation. This machine, controlled by 35 mm. motion picture film which is perforated by an indexing device, controls the riveting operation. Mechanical feelers find the punched holes in the film and relay the information to the drilling and riveting head. Three films are used to control the operation.

A large spool controls the longitudinal run and cues two other spools positioned at opposite ends of the work bench which, in turn, control the transverse run. The machine tightly clamps the work in place, drills, countersinks, selects the proper rivet. Deburring, re-assembly, and hand loading of rivets are thus eliminated.

Douglas

During 1954 Monsanto Chemical Co. developed a new synthetic rubber for Douglas. The primary need was that it would be compatible with Skydrol and petroleum base hydraulic fluids. While not yet ready for use in hydraulic fields, the new rubber is being used in experimental installations on aircraft nose wheel doors and in parts such as cushions on hose clamps.

Another development involves the use of adhesives to bond metal to metal in such applications as the attachment of non-structural doubler strips to edges of thin-gage sheet metal parts. Gas-free ingots produced in a new process by Kaiser Aluminum promise to reduce the manufacturing difficulties encountered due to gas pockets, while a new high strength alloy known as X-7079, developed by Alcoa, shows promise of affording highly improved strength and corrosion resistance in heavy sections.

Considerable progress was made during the year in the company's Aircomb section. Research and development resulted in many applications for this honeycomb structural material. Specifically, it has been adapted for use as building spandrels and faced building panels, including facings of porcelain enameled steel and aluminum.

New machines in 1954 included a device that measures, cuts, and identifies wires to sizes desired. It is completely push-button-operated and eliminates five manual operations in sizing, cutting, and identifying wire products. Eight of the machines are presently in use and nine more are to be added in the near future.

The past year also saw the development of a new washer that makes possible more accurate preloading of bolts used in aircraft assembly. The washers are designed to assure an average tension preload of 80% of the yield strength, with only slight deviations. The new washer also eliminates the need for torque wrenches. It consists of two concentric steel rings. Tightening of the nut causes the rings to bind when a desired preload is reached. This load can be controlled by choice of washer dimensions and material.

Fletcher

Fletcher Aviation Corp. of Pasadena has produced a new agricultural airplane during 1954, called the Fletcher Utility. Orders for 100 planes for New Zealand have been received so far. Other developments are classified at present.

Lear

Epoxy resins and transistors came into greater use during 1954. Lear is only experimenting at this time on the use of epoxy resins on some of their tooling. However, several of their new products have been designed to contain transistors. Among new developments in the past year are the use of printed circuits and magnetic amplifiers. There has been increased emphasis on designing component parts for powdered metallurgy and on the process of dip soldering complete electronic chassis.

One of Lear's important new techniques developed in the past year was a scientific approach to assembly position and work place layout through the use of methods-time-measurement principles. A new process for potting small RE-1F coils for aircraft radio equipment on a production scale was also put into effect.

Lear has continued to develop its regular line of aircraft radio, aircraft electronic equipment, and automatic controls, several items of which are being produced and marketed independently. These include: (1) magnetic power clutch (2) magnetic modulators (3) electronic test equipment, and (4) custom fabrication of electronic equipment harnesses.

Of primary interest, however, was the beginning of production of a new product called the Arcon. This automatic rudder control instrument keeps an airplane from entering what is called the "graveyard spiral," an unintentional maneuver inherent by the longitudinal instability characteristic of many airplanes. This 12-lb. piece of electro-mechanical equipment eliminates this maneuver, which is said to be responsible for about 9 out of every 10 accidents resulting from weather conditions.

Lockheed

During the past year Lockheed has continued its exploration of high heat treat steel (260,000 to 280,000 psi.), aluminum alloys, 17-7PH steel, and titanium. There is also considerable interest in new high strength, weldable aluminum alloys, heat treatable martensitic stainless steels, high strength precipitation hardening steels, and the newer titanium alloys.

Porous material is being installed in aircraft for boundary layer control, and despite the relatively low strength of these materials, great hopes are held that they will increase the aerodynamic efficiency of airplanes. Vinyl decals with their good abrasion, weathering, and fuel resistance and low cost have replaced metal nameplates.

Foamed polyesters, with good vibration damping characteristics and fire resistance, have been developed for light weight upholstery materials in passenger planes. Fuel resistant tapes that are not softened or washed out by hydraulic oil and fuels are being used to prevent galvanic corrosion between dissimilar metals. This type of tape also offers promise for use in electrical wiring systems where spillage of hydraulic oils and fuels is liable to occur.

Conversion type paint coatings which show good resistance to damage from hydraulic oils and fuels are now being used in the finishing of airplanes. The need of humidity and temperature control and careful mixing of ingredients are disadvantages that still have to be overcome.

Use of sintered metals impregnated with molybdenum disulfide offers self-lubricating bearings which will operate at higher loads and temperatures than are possible with previously used self-lubricating bearings. Also under development are solid film lubricants with longer life under continuous operation at loads up to 40,000 psi., and lubricants capable of operating at temperatures up to 1,100 deg. F. Disadvantages of these lubricants are those inherent in solid film lubricants, i.e. special techniques for application are required and parts must be stripped and the lubricant reapplied when parts are damaged in service.

The Lufkin Line

KOOLING TOWER . . . KING SIZE

Vic Fawcett

For the Atomic Energy Commission at Portsmouth, O., **Santa Fe Tank and Tower Company** has just completed building one of the world's largest **cooling towers.**

Statistically speaking . . . the bill of materials reads something like this: . . .

- 1½ trainloads redwood structurals (70 carloads)
- 1 carload electric motors
- 1 carload 20-foot dia. fans
- 1 carload drive shafts and couplings
- 1 carload **LUFKIN Model 115-VB** Spiral Bevel Gear Reducers for fan drives.

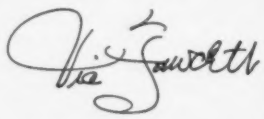
It's a 40-cell tower, a total linear length of 1440 feet and has a cooling capacity of 185,000 gallons per minute.

Santa Fe, a member of the Cooling Tower Institute, is one of the leading manufacturers of induced draft cooling towers and has nearly 50 years experience in this field.

LUFKIN Type VB Heavy Duty Fan Drives are standard equipment on all **Santa Fe towers** . . . especially designed . . . **right angle spiral bevel gear reducers** . . . for induced draft **cooling tower** service.

Large multi-cell **Lufkin-Santa Fe** refinery installations recently placed in service are . . . Standard Oil of Indiana at Whiting . . . Union Oil of California at Oleum . . . Gulf Oil Corporation at Krotz Springs, Louisiana.

LUFKIN Spiral Bevel Gears Type VB are serving the **cooling tower industry** from coast to coast.



LUFKIN FOUNDRY & MACHINE CO.

PACIFIC COAST DIVISION

5959 S. Alameda St., Los Angeles 1, Calif.

Dallas Lufkin, Texas New York

(Lufkin produces the finest . . . Gears . . . for Cooling Towers . . . Herringbone Reducers, double and single reduction . . . Pumping Units . . . 2-Cycle Gas Engines.)

AIRCRAFT

. . . Begins on page 64.

Currently being developed are brazed metal honeycombs and cermet coatings for use under high temperature. These hold promise of: (1) light-weight, high temperature components, and (2) the use of leaner alloys for high temperature service. Properties and processing techniques of these products must be further evaluated before being used in production. Also under investigation are chemical etching for low cost removal of large volumes of material and immersion nickel plating which will reach deep recesses.

Steel and titanium alloy extrusions have finally reached the stage of limited production on the West Coast. Despite their high cost and straightening and machining problems, the possibilities of obtaining high strength finished shapes for structural airplane components without complicated sheet metal forming or fastening problems look fairly good, both from an engineering and manufacturing viewpoint.

Stretcher leveled aluminum alloy plate for machining of integral stiffened structures has become standard at Lockheed. Despite the limitation of available stretching equipment for large plate and its slightly higher cost, the use of stretcher leveled plate has resulted in minimum warpage (liable to occur after machining) and has greatly reduced the problem of obtaining the desired contour in the finished part.

The process of metal gathering of steel tubes has been developed for a low cost, rapid method for production of push-pull control rods. No-draft precision forgings are being used to reduce machining costs.

The improvement of integral fuel tank sealant's fuel resistance, to minimize the need of protective coating, has progressed rapidly. Chloremethane adhesives with much better air-drying characteristics have been developed for general purpose use. Improved silicon-fiberglas flexible ducting for fire-zone use, capable of withstanding 2,000 deg. F. for 15 minutes, have also been developed.

Compression forming of sheet metal has been a major achievement of the manufacturing department. The increased precision obtainable (approximately one third that of normal sheet metal forming) is being used to produce the accurate contoured parts required for high speed airplanes.

The facing of metal drop, draw, and stretch dies with resilient epoxy resin has resulted in building cheaper dies more rapidly. The production costs and rate of impact extrusion dies have been greatly improved by the use of an Elox electric discharge machine.

Reduced allowables for magnetic tolerances and inadequate rectification in the demagnetizer power supply was causing difficulty (and higher costs) in the compensation of installed magnetic compasses. Development of an improved electrolyte for the demagnetizer power supply solved the problem.

The addition of a die loader to one of the draw presses having a high rate of die change has reduced press and operation costs $14,000 per year. A change of cutter coolant in the company's router section has resulted in improved working conditions, elimination of subsequent degreasing operations, and reduced cost of coolant.

Revision of the procedures and methods of maintaining identification of aluminum parts during processing has reduced the cost of that operation by approximately $200,000.

A method of compression forming sheet metal parts has been developed which provides sheet parts having tolerances normally associated with machine parts (plus or minus .010 in.).

A method of assembling light aluminum jig frames by using glass fiber tapes and epoxy resin for corner joints provides a cheaper, distortion-free unit. A new pressurized vacuum chuck seal will handle gaps up to ¼ in. under warped material. The seal is also easier to install and much less subject to damage.

A new lightweight mandrel for lay-up and cure of glass plastic ducts has been devised which is cheaper to make and easier to use. The mandrel is made by hydraulically expanding a brass tube inside a master. In use, the mandrel is hydraulically expanded for lay-up and then allowed to shrink for easy removal of the part.

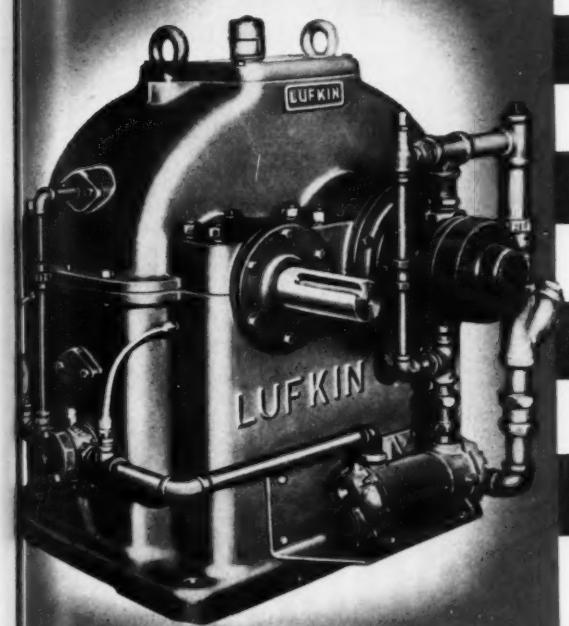
Considerable development work has been done on the impact extruding of 4130 steel shapes at elevated temperatures with satisfactory results.

Material needed for fabrication of large sheet metal bulkhead rings has been minimized by edgewise stretch-forming of stacks of strip stock to the curvature required prior to forming the flanges by standard methods. Damage to installed airplane windows has been eliminated and visibility maintained by taping on a piece of clear plastic sheet.

An improved protective plastic cap

Lufkin

HERRINGBONE GEAR SPEED REDUCERS AND INCREASERS



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ANY RATIO

1 TO 1 TO 70 TO 1

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WHERE SPEED IS REDUCED OR INCREASED . . . . . .

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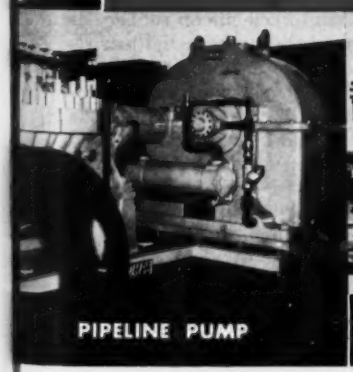
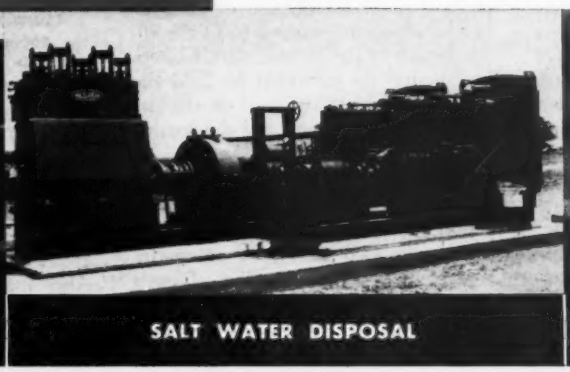


PIPELINE PUMP



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for in-process plumbing lines is being procured.

Marquardt

There is considerable interest in a recently developed thorium-bearing magnesuim alloy, HK 31, for use at temperature to 650 deg. F. A weldable, all-alpha, high strength titanium alloy, A1 10, shows excellent high temperature properties and is also promising.

While the magnesium alloy is entirely weldable, with excellent joint strength, there is some loss in ductility and the welding process itself is somewhat critical. The titanium alloy provides extraordinary strength-to-weight properties but cost and delivery date limit its use at the present time. Forming is difficult, even when hot.

Special combinations of existing materials are providing usable strength properties above 2,000 deg. F. The HAE process for protection of magnesium alloys has extended their usefulness considerably.

The development of the flo-turning or hydro-spinning process of framing contoured shapes from cones and cylinders has extensive future application in the production of jet engine components. This process can form stiffened, tapered, contoured parts for turbojet and ramjet engines.

Drilling of precision holes 0.025 to 0.060 in. in diameter in work hardened high temperature alloys using high speed steel drills has been developed at Marquardt for use on afterburner fuel manifold spray bars.

The development of hot riveting techniques for driving Monel rivets into aluminum and magnesium sheet material has been undertaken successfully in the past year. This process has also been successfully performed using titanium rivets into titanium sheet metal. Monel rivets must be used with the new high temperature magnesium alloys to provide a fastener with comparative strength at operating temperatures above 450 deg. F. The galvanic corrosion potential of this combination is taken into consideration in the design and fabrication of parts.

The use of fiberglas laminated plastics at temperatures of 500 deg. F. and higher and exposed to high air speed has been investigated. Phenolics, silicones, and epoxy-phenolics are also being considered.

There is an increasing use of large capacity electro-arc machines for producing complicated die shapes and tools, and cutter grind work with carbides. Impact extrusion dies are currently being fabricated with this process 8 sq. in. or larger in area from solid tungsten carbide. This operation would have been completely impossible several years ago.

North American Aviation

Chem-milling (a joint development of North American and Turco Products and licensed to the latter) has been providing North American with a method of sculpturing metals to the exact weight and geometrical relief dictated by design. The process permits almost any desired complexity of relief-design: depending on the size of the tank, any number of parts may be simultaneously etched with like results. Research is continuing on improved masking techniques and has been extended to cover etching possibilities in metals other than aluminum, such as steel, stainless steel, titanium, and others.

Lack of flatness and the presence of "cans" in titanium sheet stock has resulted in excessive bench work on machine formed parts. A simple method has been developed to simultaneously flatten, remove cans, and stress-relieve titanium sheet.

The process involves a fixture comprised of two flat steel plates, rectangular in shape, equipped with simple clamping devices around the complete periphery. The wrinkled sheet is placed between the steel plates, the clamps tightened, and the entire fixture placed in an annealing oven. Titanium sheet flattened in this manner completely eliminates cans or lack of flatness without sacrificing elongation units.

Distortion resulting from the heat treating of formed titanium parts has been greatly reduced through the use of simple hot forming fixtures. This process involves the use of contour blocks which are shaped to fit the entire length of the formed part. Clamping media are provided to hold the contoured blocks in perfect contact with the formed part and the loaded fixture is then oven heat treated.

North American has converted a Betts Pit type planer into a dual horizontal spindle bridge-type milling machine, equipped with fully automatic controls for the machining of such features as lands, risers, intergral ribs, and pockets in the horizontal plane of wing skins. For this machine, two wing skins can be rough and finish-machined in the time normally required for the same amount of work on one skin.

During the past year North American's Downey Division was in on the development of an angle-of-attack calibrator, a vane jump angle computer, a miniature two-way communications unit, and an emergency traffic control system.

Currently being tested is a prototype automatic wire preparation machine designed to automatically, and in one continuous operation, measure to length, number, cut, and end-strip multi-strand, single-conductor aircraft wire in gages 10 through 20.

Titanium was used more extensively during the past year as an airframe structural material, and foam-in-place Isocyanate plastic foam is being used in a number of applications as an internal support for structural members. The latter offers light weight and convenient application, but at present batch-to-batch variation in density and physical properties is too great.

A new process for hard anodized aluminum coatings is offering advantages of hardness, wear, and seizure resistance, low coefficient of friction, electrical insulation, and excellent corrosion resistance. Principal defects are brittlesness and a tendency to reduce the fatigue life of the base metal.

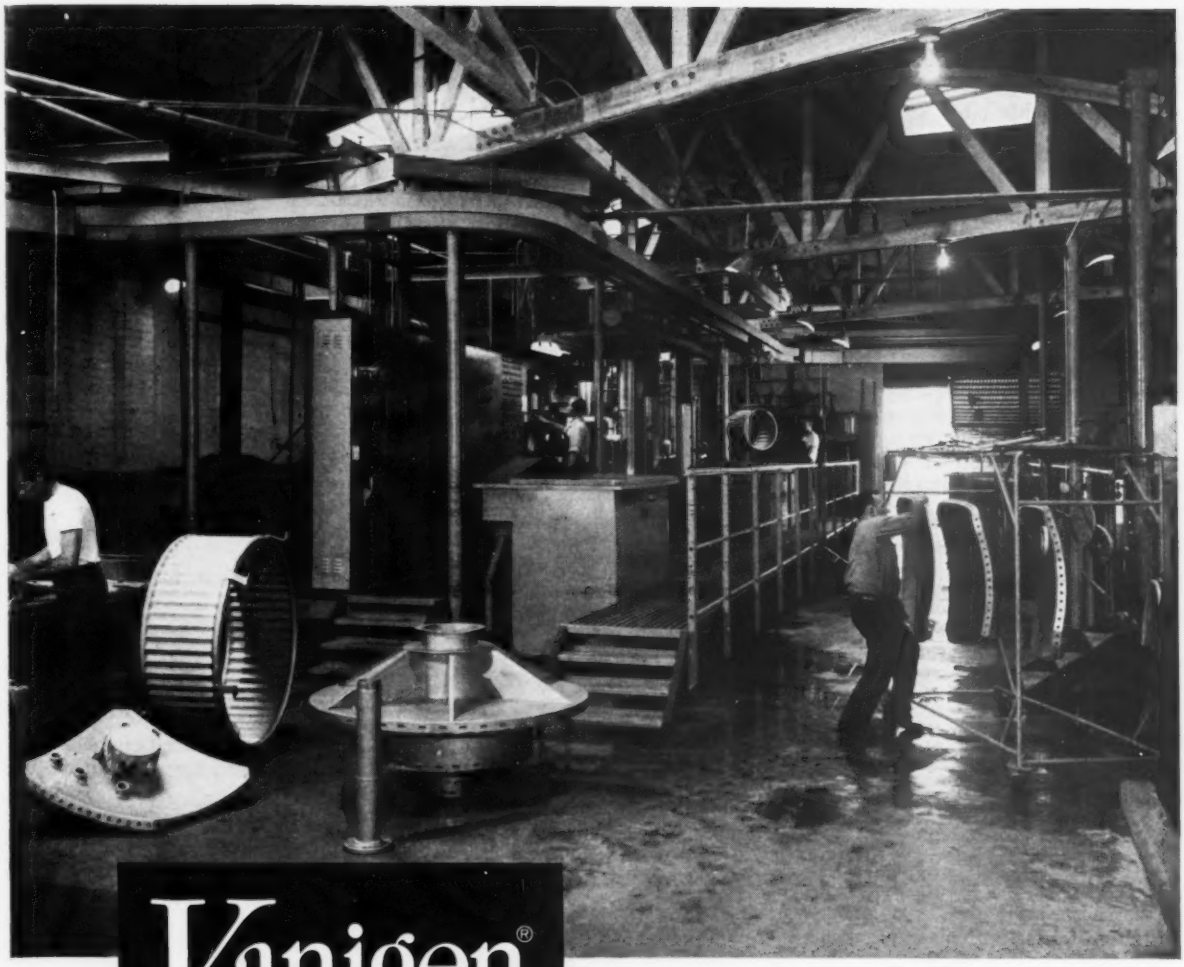
Jig stress relieving of formed aluminum parts to obtain more accurate contours and flatness has been developed by the production development laboratory and production departments. It has been used principally on heavy wing plates. With the increasing use of titanium sections, a Yoder roll forming machine has been installed to apply new techniques in titanium forming.

Northrop

Brand new materials developed by the industry and being tested by Northrop are the polyfluorobutylacrylates. Temperature characteristics and resistance to synthetic lubricants show considerable promise.

Silica reinforced silicon rubber has improved tensile strength and tear resistance, but is still difficult to attach. Teflon filaments show extreme chemical resistance for production of felts and fabrics and likewise exhibit good heat resistance. During the past year Northrop has installed a complete conveyor and flow-coating system for applying zinc chromate primer and other required finishes to airframe parts. Also installed was the largest Dy-Check facility in the United States, completed for nondestructive inspection of critical parts. This process, originally developed by Northrop, has been licensed to Turco Products. It reveals hairline cracks and flaws that otherwise might go undetected.

A new 750-ton capacity stretch press has been installed for forming large skin sections, and new roll-deburring equipment will soon be completed to



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Kanigen plating is controlled to the exact specified thickness on *all* surfaces, regardless of size or shape. No bare or thin spots, no excess "build-up" of plating. Kanigen plating also is generally superior in corrosion resistance, durability and hardness. Plates on iron, steel, brass, bronze, copper, aluminum and powdered metals.

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Phone Bradshaw 2-2143

eliminate the hand deburring now performed on many parts.

A large double table hydro-press (7,500 psi.) was installed for forming dissimilar airframe parts simultaneously. Parts thus formed require less hand finishing than parts formed by conventional means. A vapor mist lubrication system is now giving the operator better control of the lubricant, which increases cutter life and reduces haze.

A power driven drape forming tool

PARTS OR MATERIALS NO ONE SEEMS ABLE TO PRODUCE

Boeing

A high temperature fire wall sealant for normal operating temperature of 300 to 400 deg. F. with shutdown temperatures of 700 to 800 deg. F. and with 2,000 deg. F. CAA fire test requirements. The sealant should be a one-part, one-application compound resistant to oil, grease, fuel, hydraulic oil, and water.

Convair

1. Steel castings of aircraft quality for structural items, preferably cast to close tolerances.
2. Precision steel forgings with controlled decarburization capable of being heat treated to a strength in excess of 200,000 psi.
3. High temperature plastics.
4. High temperature non-ferrous alloys.
5. Thermally stable transistors.
6. High quality mag-amp toroids.
7. Large area thin-section nonferrous forgings.
8. High strength magnesium and aluminum alloy castings.
9. High temperature hydraulic fluid, hose and fittings.
10. High temperature adhesives for use in the range of 500 to 600 deg. F.
11. Titanium castings and extrusions.

Douglas

Alloy material with a low content of expensive and strategic materials for use in the temperature range 800 to 1,600 deg. F.

Lear

1. Most electronic components to withstand extreme high temperature.
2. Precision ceramics.
3. High quality plastic parts.
4. Greater accuracy in die castings and powder metal parts.
5. High frequency transistors in production quantities.

Lockheed

1. Sound steel casting by any method.
2. Thin large section light alloy castings.
3. Development of high strength titanium sheet alloys, preferably with good welding characteristics.
4. Development of high-strength steel impact extrusions.
5. A flexible wave-guide to withstand pressure requirements, yet not too brittle for ordinary shop handling.
6. Flexible, leak-proof couplings for large air ducts operating at 700 to 900 deg. F. without imposing extra loads on the system.
7. Explosion suppression systems for fuel tanks.
8. Light-weight, high strength fittings for fuel cells and foolproof, leakproof filter caps.
9. Ball bearing screws that are jam-proof.
10. Reliable dielectric loaded materials to be used as a core in radome wall sandwich construction to provide the electrical properties of solid laminates.'

Marquardt

Manufacturing in small quantity lots of:

1. Turbine blade shapes from wrought material.
2. Better aluminum and magnesium alloys.
3. Highly intricate castings in the newer alloys of aluminum and magnesium.
4. Fabricated honeycomb shapes with double curvature and a useful temperature range of 1,800 deg. F.

North American

1. Elevated temperature resistant, transparent, formed enclosures of plastic or glass.
2. Sealing components resistant to temperatures up to 500 deg. F.
3. Commercial production of titanium extrusions, castings, tubing, and fasteners.
4. Bearings for operation up to 700 deg. F.
5. Uniform cell size, stainless steel honeycomb core suitable for service temperatures above 400 deg. F.

Northrop

1. Top quality optical glass in large sizes with thermal, shock-resisting characteristics.
2. Close tolerance parts (i. e. .0003 and .0001 inch in linear, concentric, and radial tolerances) in good size quantities.
3. Precision transducers and vacuum impregnated terminal boards.
4. Close tolerance sheet metal parts.
5. Machine tools for precision gears.
6. High cycle, high speed machine tools for maximum cutting speeds on non-ferrous alloys.
7. Titanium fasteners for tension applications.
8. Wide tempertaure range elastomer with resistance to synthetic lubricants.
9. Information on very short high-temperature characteristics of metals, plastics, and adhesives.
19. More information on foamed-in-place materials.

Ryan

1. Reliable titanium fasteners.
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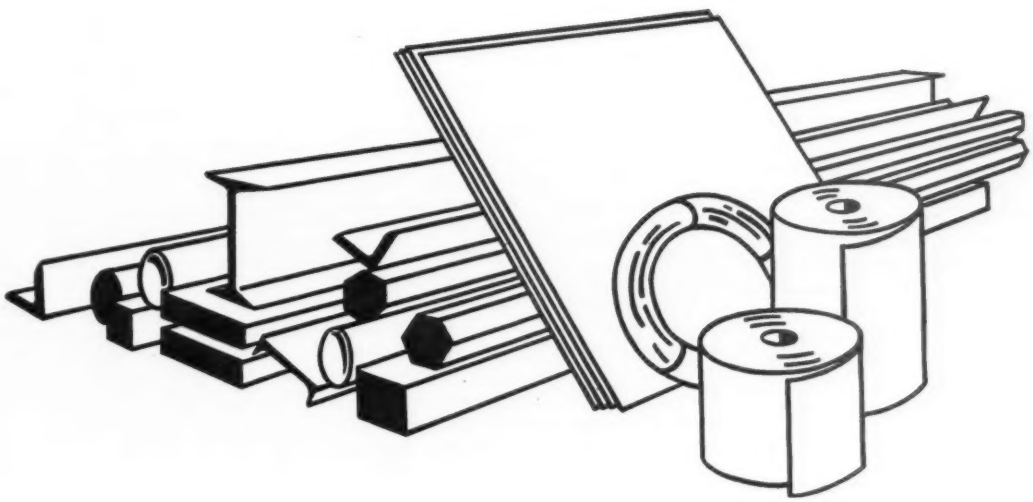
Solar

1. Titanium alloys of reasonable high temperature strength that are weldable.
2. High temperature O-rings capable of operating at up to 600 deg. F.
3. High temperature components such as solenoids, motors, actuators for use where temperatures hit 600 deg. F.
4. A pressure sensor for detecting changes in pressure from 0 to 1,000 psi.
5. An unheat-treated machinable material that is heat-treatable to Rockwell C60.
6. A non-electrical inlet air temperature sensor to withstand vibration.
7. Alloys capable of retaining their integrity at steadily higher operating temperatures.

STEEL



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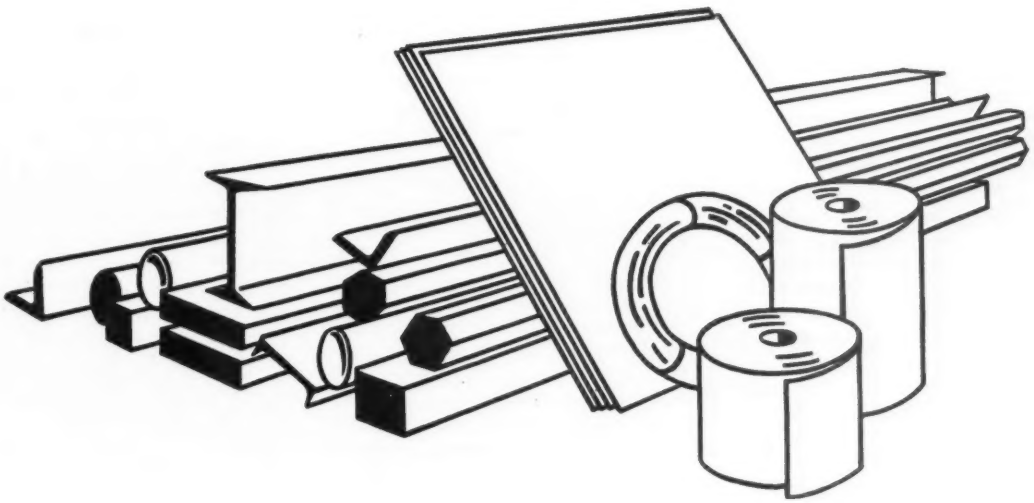

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THE HOUSE THAT SERVICE BUILT

has been developed for forming two acrylic windshield side panel glasses at one time. This improves the optical properties of the glass by approximately 20%. A resin impregnating machine is being installed for use in producing fiberglas laminates. It eliminates hand impregnating of these materials.

Northrop's manufacturing control has developed and applied a central control service system built around the latest available type of mechanized business office machines and a new facility-wide communication system which provides an instant written visual message to and from all productive sources where manufacturing control services are required.

An application of hydraulic (bulge) forming has been developed in the production of an engine accessory cowl fairing. The part is nonsymmetrical, 22 in. in diameter at the open end and 30 in. long. It is fabricated to completion from one piece in three stages. By producing this part in one piece, eight parts and many operations are eliminated, but even more important, the finished product is more consistent and less expensive than its predecessor.

Hard anodic coatings have been introduced into some new designs. Here the aluminum is subjected to a treatment akin to anodizing. Products of these processes are materials which have an extremely hard outer surface with a corresponding increase in corrosion and erosion properties, particularly important to the design engineer. Use of these materials has made it necessary to reconsider methods and tools for cutting, drilling, and machining, due to the very hard surfaces produced.

Electronic production analysis work books are being used to break down complicated electronic assembly into simple step-by-step jobs. This permits the use of lower labor grades and provides higher and more uniform products.

A Verson-Wheelon sheet metal forming press has been installed with pressures available up to 7,500 psi. and a table size of 36 x 144 in. Hydraulic pressure is utilized in conjunction with a rubber diaphragm which presses against the sheet or plate stock being formed. With the pressures available, the majority of hand forming is eliminated and the press will accommodate much larger pieces than any other high pressure hydro-press in the plant.

D I T-M C O universal, automatic, electrical circuit analyzers are being used to check electrical systems for current leakage, resistance, and continuity of electrical subassemblies, harnesses, and complete airplane electrical systems. This electronically operating device improves quality and reduces check-out time considerably.

Newly developed portable tooling includes the Cable Airbuck Swager, designed and developed by Northrop. It operates pneumatically and is similar in size and shape to a portable rivet squeezer. The machine promises to greatly supplement stationary machines and will find use on the assembly line and in field service where stationary equipment is not available.

T. W. and C. B. Sheridan Co. has developed a machine for progressive compression and retention stress forming process. This method of forming is unique in that it provides an automatic means of longitudinal stretch forming of a taper machine's extruded shapes and skins. It provides great weight savings for the designer and a low-cost, automatic, mechanical means of producing detailed parts. The method shows great cost saving advantage in forming constant cross section shapes and shows possibilities of providing a productive means of forming integral stiffened extruded skins.

Patent rights are held by a Northrop employee who has issued an exclusive manufacturing license to the Sheridan Co.

Among the Northrop by-products produced during 1954 is an airplane towbar assembly for towing aircraft on the ground. The bar contains a safety device which keeps the plane's nose wheel from turning in excess of its normal arc. The Hammond Manufacuring Co. of Pasadena, Calif., has been licensed to produce the towbar and also has a license for producing an elevating dolly. The dolly features a movable frame which can support heavy equipment, either end of which can be elevated or lowered independently.

Stepper Motors Corp., Culver City, Calif., was organized for the specific purpose of manufacturing incremental motors developed by Northrop. One type of motor now in production is a reversible high speed stepping motor of extreme accuracy used for digital servo-mechanism applications. It converts electrical pulses into mechanical movement, giving positive control. Also under license to Stepper Motors is an auto memory clutch, a new type of automatic electrical measurement control device, and a DC chopper, a single converter used as a means of converting a slowly varying signal to an alternating signal suitable for amplification in amplifiers operating on alternating current.

An explosion suppression device developed by Northrop is under license to Standard Safety Equipment Co. for inerting empty fuel cells in aircraft. This development nullifies fire and explosion dangers aboard aircraft while they are on the ground. Empty fuel cells are made inert by using a wire canister filled with dry ice. The dry ice releases enough carbon dioxide to inert the oxygen and remove fire hazard.

Ryan

In line with the need to lessen the weight of aircraft engine components, Ryan has been engaged in producing sheet metal jet engine blades. In order to accomplish this work, it has been necessary to find methods of fabricating and assembling tapered stainless steels and develop extensive high temperature brazing. Blade polishing techniques have also been refined so that a minimum amount of material is removed while still yielding the highly polished surface that is required.

Due to government requirements that less strategic materials be used in jet engine fabrication, new manufacturing techniques are being developed to form, weld, and machine some of the newer, less ductile, high temperature materials. With this in mind, Ryan is developing high temperature ceramic coatings which will extend material life by several times. Also being worked on are cermets, both as coatings and as solid bodies.

New methods for producing thin wall ducting components are being developed to meet the increasing demand for light-gage pneumatic ducting. Included are balanced slip joints, misalignment fittings, and duct sections. Advanced techniques for resistance and fusion welding of .002 in. stainless steel are being devised to accomplish this work.

Ryan has been working on development of materials which will withstand higher skin temperatures generated by higher speed flight, including manufacturing techniques for titanium alloys, honeycomb sandwich paneling, etc.

Electronically controlled fabrication machinery used at Ryan offers the advantage of minimizing tooling costs because tooling is controlled by electronic means rather than mechanical devices, such as cams and templates. However, initial costs are high and setting-up requirements of the equipment are somewhat inflexible.

Important techniques put into use

during the last year include electrical discharge grinding of tool bits and difficult-to-machine production parts, chemical removal of metal, and further development of light structural materials.

Electrical discharge grinding allows the grinding of carbide tool bits to a 10 micro-inch finish, which gives increased life. The grinding is done with an inexpensive brass wheel rather than a costly diamond wheel. Unfortunately, no one in this country makes the entire grinding machines.

Bending equipment for light-gage metal ducting of penumatic systems produces tight, wrinkle-free bends.

Solar

One of the most significant developments during the past year has been the increasing utilization of low-alloy, heat-treatable steels in aircraft gas turbine parts and structures. These low alloys are replacing stainless steel in a number of applications in the intermediate temperature range (600 to 1,000 deg. F.). They are heat treated at approximately 1,750 deg. F. and case hardened by air cooling. They are currently being fabricated into a variety of components including turbine inlet guide vanes, fuel inlet housings, and compressor casings.

These low alloys offer higher temperature at thinner gages in the intermediate temperature range, and they conserve critical alloying elements, notably chromium, nickel, and columbium. On the other hand, the current disadvantages are the lack of production experience, which results in fabricating and welding problems, and the fact that these low alloy materials are not as ductile or corrosion-resistant as stainless steel.

There were three particularly significant advances in manufacturing methods at Solar during 1954. They include: (1) continued development of new high temperature brazing methods for handling sheet metal blades for gas turbines and high temperature all-metal honeycomb sections, (2) development of automatic machining methods, which in one example allowed the reduction of machining time on a small gas turbine inlet scroll from 3 hours to 3 minutes, and (3) development of mass production techniques for shell mold casting of stainless steel alloys and the application of the shell molding, for the first time,to such materials as Type 410 stainless steel.

The equipment trend during 1954 was the use of atmosphere-controlled furnaces for heat-treating low alloy steels. Also of interest was the increasing utilization of nondestructive testing equipment, including X-ray, Magnaflux, Zyglo, and other electronic techniques.

The chief advantage of radiographic testing equipment is that it contributes significantly to the development of high-strength, high-quality parts and components, which may in some cases be made of less expensive material.

Western Outlook

MISSILES

Absolute reliability at high temperatures for all components is a problem.

MISSILE research and development is taking as much of the defense dollar today as aircraft research and development, and the nation's missile program is now a multi-billion dollar business, which has attracted practically every aircraft and engine company as well as numerous electronic firms.

Like the aircraft industry, a heavy concentration of missile research, development, manufacturing, and testing is centered in the Western states. With organization of Lockheed's Missile Systems Division in January 1954, the "big five" aircraft manufacturers located in Southern California now dominate the scene, a natural outgrowth of the specialized talents of the aviation industry. Guided missiles are a combination of systems, and the aircraft industry is thoroughly experienced in systems business. This accounts for its rapid progress in the missile field.

Inasmuch as the complete missile "weapon system" includes launching, guidance, and control devices in addition to the missile itself, its power, and armament, this system calls upon a varying number of skills within the fields of science and engineering. Until development reaches the production stage and the specific role of the missile is clearly defined, it will place even heavier demands on these fields.

Military planners now assign six basic roles to the missile; surface-to-air, air-to-air, surface-to-surface, air-to-surface, air-to-underwater, and underwater-to-surface. Of all these, it is certain that various projects concerned with perfecting successful intercontinental missiles are summoning the country's top scientific brains and they will continue to be long-range programs.

The research and development stage has presented many problems. Solution of these problems has required the integrated effort of physicists, scientists, and engineers alike with considerable emphasis on electronics.

Topping all of these is the reliability problem. Because there is no pilot to exercise judgment and correct for minor errors and malfunctions, the guided missile must have an inherently higher degree of reliability than aircraft. The demand for absolute perfection of each part is essential, not just an optimistic goal. Attempting to achieve a high degree of reliability, in some instances, has required five times as much research and development time as did the development of some of our jet aircraft.

Unlike aircraft, where one or two experimental planes are built and countless test flights are made in these craft, evolution of a successful missile system may require as many as 100 prototypes for testing. Aerodynamic characteristics, trajectories, and other in-flight intelligence are transmitted to ground test stations, where a staff of trained technicians conduct these test programs.

The need for rapid reduction of this data for study and analysis has brought about the considerable use of electronic computers and automatic data reduction equipment. Systems are being designed which will link the data-gathering process more closely with data-reduction techniques.

This activity has developed a vital need for new materials. The speed and altitude ranges in which missiles operate result in many new considerations of aerodynamic factors affecting structural and airframe design. One of the greatest factors is the high-skin temperatures associated with high-speed flight.

These temperature average above 600 deg. F. and accordingly have created a need for improved sealants, paints, coating materials, and lightweight metals capable of withstanding these conditions without impairment of specific strength. New fields of use for titanium and plastics may evolve from this need. Stainless steel has proved quite successful, and the lighter metals—magnesium and aluminum—are still widely used.

The countless numbers of items that constitute missiles have to have finer tolerances in order to meet reliability requirements. Because this industry is still not in an all-out production stage, only small quantities are being purchased. These are mainly standard items, such as resistors, condensors, etc., with some newer items like transistors promising to be a good cure for electronic ills.

Western Outlook

COMPUTERS

Machines for automatic control, accounting, engineering are gaining acceptance.

ALTHOUGH analog and digital computing have historically been distinct and divergent activities, recent developments have reduced this division to such an extent that many current operations in these fields are really hybrid functions which utilize techniques taken from both fields.

Examples of the application of this combined technique could include: automatic navigation of aircraft, control of machine tools and production processes, completely automatic telephone exchanges, and centralized traffic signal control. Many developments in this field have been the result of recent research activity by Western organizations. A typical development which is predominantly the result of Western activity is the automatic navigation of aircraft.

As with any major engineering activity, the application of analog and digital computers to control systems has created the need for auxiliary devices. In this case, the main requirement is for conversion devices to convert from analog to digital representation of data, or from analog or digital data to physical quantities such as position, speed, temperature, or pressure. Since devices of this type can be produced by the small manufacturer, this field has provided the smaller industries of the West with a market for new products.

In the present enthusiasm over applications of digital and analog computers to automatic control, one should not overlook the continuing widespread use of these distinct machines in computing the solution to scientific problems and in reducing the tedious manual labor associated with modern accounting procedures. The modern analog computer in making use of recent developments in electronics techniques has proven itself to be of great use in the solution of many types of engineering problems. Since this is the oldest of the computing fields, it is the most firmly established, with many machines on the market of different capacity and cost.

For problems requiring more accuracy than the analog computer can provide and for accounting applications, the automatic digital computer supplies the better system. Since production models of the moderate priced magnetic drum memory computer have been announced in the past year, there are now machines available within the economic range of the moderate sized company.

It may be significant that the commercial production of machines of this type is concentrated almost entirely in the Western states. For the very large organization with big problems and very big research budgets, there are the high capacity machines with a corresponding high cost. To this date, no Western manufacturer has publicly entered into this field; however, it is likely that at least one California organization will announce a machine of this type during the next year.

It appears that 1955 will be a good year in the computer field both for the manufacturer and the potential user. The successes of the early machines have become apparent, and as a result manufacturers now have a backlog of orders for equipment. On the other hand, production lines are now in operation and the prospective user has some hope of obtaining a machine in a reasonable amount of time.

Western Outlook

INSTRUMENTS

National society to meet in the West. Aircraft people are now making their own.

THE decision of the highly-rated Instrument Society of America to hold its annual convention and exhibit on the Pacific Coast for the first time (Los Angeles, September 12-16) is regarded in instrument circles as significant recognition of the West's growing importance as an instrument manufacturing and using area. It will be the largest show ever held in the West exclusively devoted to instruments.

Some aircraft firms are becoming instrument manufacturers in a big way. Hughes, Douglas, Northrop, and North American all have tremendous programs, not only in computer systems and components but also tape recorders, sensing elements, etc.

Interest in the trend toward use of data logging systems has been heightened by their installation in two petroleum refineries in the West, Union Oil at Santa Maria, Calif., and Standard of Indiana at Casper, Wyo. The Atomic Energy Commission has found them indispensable in handling the staggering amount of data involved in its work, but private industry has not been as quick to accept the idea.

This trend forecasts the gradual reduction in size and number of control boards and the ultimate appearance of controls concentrated on a desk like that of a load dispatcher in an electric power plant.

This form of instrumentation transmits the variables appearing on an instrument panel by signal from the ordinary standard recorder to special electric typewriters that transfer this information to log sheets. The flow, for example, can be integrated and totalized on any time basis desired, thus eliminating the need for planimetering flow charts. Equipment can be made available for transmission of certain of the data to a central location and the data automatically processed by computers for accounting or other purposes.

Process control

Process control by end-product analysis, using spectrographic instruments, seems to have tremendous potential, not only for petroleum but also for the food, soap, beverage, and other industries. This will permit automatic anlysis of the composition of the material being processed; for example, the measurement of the water content of an organic hydrocarbon stream and by an on-and-off alarm notifying the operator when the product is becoming clouded. Control of the intermediate or forward parts of the process may also be subject to automatic analysis.

Adaptation of continuous recording analytical devices or instruments may be eventually tied into automatic logging. Many of them will require electronics in one form or another and will bring into being specialized repair and service men trained to handle these new types of devices.

Many industries will have to work out their own analytical devices, but in some cases the research work by such captive Western laboratories as Shell Development Co. for Shell Oil and Shell Chemical results in equipment which can be licensed to commercial manufacturers and thus be made available to other industries.

Mining companies in the West have become an important market for instruments. The use of flame photometry for qualitative and quantitative analysis of metals is a good example. It is more than five times as fast as the gravimetric method.

Expansion of manufacturing facilities in the West continues at a rapid rate.

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Western Outlook

ELECTRONICS

Research spending in West runs 10% ahead of nation in area's fastest growing industry.

By ROY C. HENNING
Consulting Editor
Western Industry
Electricity and Electronics

RESEARCH activity in the Western electronic industry tops the nation.

According to latest available figures, Western electronic research costs (pro rata) are 10% more than electronic research nationally. And the electronic industry as a whole spends nearly three times as much of its gross sales on research projects as does industry in general.

These figures substantiate the fact that the electronic business is highly competitive as a whole . . . and particularly so here in the West.

In spite of two important fixed disadvantages, Western electronic industry has shown a marked and significant growth and gain.

1. Wages in this area are 15% to 20% higher than the national level in this industry. (One main characteristic of electronic equipment cost is that it contains a high percentage of labor.)

2. Freight on raw materials and component parts from the East is disproportionately high. Cost of the finished product must of course be marked up on this account twice—the finished products have to be transported to their consumer market.

New electronic plants and offices are popping up like mushrooms after a spring rainstorm. Some of these are branches of old established firms who are taking the inevitable step of colonizing the young West.

Other concerns are small ones, in some cases basement workshops. But don't scoff at these potentially mighty atoms of electronic activity. They may turn out to be future giants. This seems to be the Western development pattern, e.g., Eitel-McCullough, Inc., of San Bruno, Calif.

In 1934 this was a two-man operation in a rented store—a one-man butcher shop. Today it is a 1,000-man operation covering thousands of square feet of area with the entire world as its market, selling vacuum tubes that are now considered standard in the industry. This is one "mighty atom" that, in true Western style, exploded into the world's largest.

Birth rate of the electronics industry in Los Angeles area is very high. Many companies get started in electronics there because large Eastern firms aren't much interested in producing new items for which they think there will be only a limited market.

They should ponder the knowledge that the West is growing at the rate of 628,700 people every year. While California was the fifth largest state in the Union (in population count) only a few years ago, it is now second. Soon it will be first, at this rate. The way the national complexion of the electronics industry is developing, it may not be too long before the West is the headquarters and the East is relegated to colonial status. The real live-wire, wide-awake national electronic firms are already in this area with "watch-dog" plants and offices.

Today, the electronics industry is an $8,000,000,000 industry—including television, radio, military electronics, commercial electronics, broadcasting, and all other phases of the business. Leaders in the industry predict that within seven or eight years it will be a $13,000,000,000 annual business. This will make it—if it isn't right now—the world's fastest growing industry, and one to account for.

Quality refinement

But regardless of the tremendous advances in physical size of the Western—or national—electronics industry, advances in research this past year have been primarily steps toward refinement rather than development of new things. New discoveries, of course, are always in the making — but nothing of a really startling nature has broken out of the labs this past year.

When a startling discovery does break the news front, its revelation is usually a long time in advance of the end product use or availability. For example, Bing Crosby Enterprises announced the putting of video on magnetic tape over a year ago, and RCA's David Sarnoff followed quickly with the news that his engineers had performed the same feat; but today, as far as the general public is concerned, the process is still in the laboratory. (New ferrite materials are being developed for the tape, so that more intelligence per given length of tape can be stored.)

Although color television is available, no one knows for sure just when it will come into widespread use. It could come about quickly as did black and white TV. However, black and white will be enjoyed by people for a long time to come, just as radio is still being enjoyed.

UHF-VHF

Next point: What will happen to UHF? Whether the UHF TV frequencies become widely used or fall into the discard (as did FM broadcasting, you remember) may be decided one day by the FCC. If a shift of all TV broadcasting were made from the present VHF channels to the new UHF channels, certain technical and economic advantages would be gained. But, as always, at the expense of either the set owner or the broadcaster, or both. This decision may be a long time in coming.

A radically new picture tube is being developed. It is still in the lab under wraps. It will bear no resemblance to present day tubes. It will be only three or four inches thick and have no long neck. The effect on cabinet design by use of this tube could be revolutionary.

Another new product the set owner may some day use in his home is the multi-sphere speaker—a speaker of entirely new principle.

What about the transistor? That's the world-shaking electronic development of a few years ago that was heralded as the replacement for the vacuum tube. But other than a limited commercial use in the hearing aid field, it is still in the laboratory.

Production line yields for high quality transistors are still poor. Quantities of production are satisfactory, but the acceptable quality level is less than 50% for the best grade transistors. For hearing aid application, where the call for reliability is less than that needed in aircraft, the acceptable quality level is much better, and easier to meet.

Scientists are still trying to beat the transistor's inherent weakness: susceptibility to heat and moisture. Silicon, though it doesn't have some of the good properties of germanium, does show the best heat and moisture immunity.

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LET US HELP YOU TO CONSERVE YOUR WORKING CAPITAL!

Better quality control is needed in transistor manufacture to step up the yield of a good product. The standard quip of the vacuum tube engineer about the transistor is: "Transistors are just fine, if you seal them up like a vacuum tube." And this is precisely the case. The best transistor results have been achieved in this manner.

In defense of electronic research development, though, it might be here noted that the seemingly long interval between first public announcement of a new product and its appearance on the market (so you can buy one) is no longer than in most any other field of science.

Military research

On the "new idea" trend of thought, here's one for you: a brand new pattern of industrial reasoning that involves both manufacturing in general and electronics production in particular.

And it's such a simple thing: it involves the military and the manufacturer getting together and working out the details of a new product intelligently, between themselves, before they decide to make a million of them and find out, months later, that the design won't fit the machines—or that the metal stock doesn't come in those sizes—or some other such impossible problem, after they've spent scads of the taxpayers' dollars pursuing a futile project.

Beautifully illustrating this new idea is Motorola's new facility at Riverside, Calif. Technically, this "new idea" is termed "operations research applied to systems study."

The end result of such a program is the complete integration of the efforts and thinking of, for example, the military man, the military engineer, the manufacturing engineer, and the manufacturing production chiefs. Savings in both money and effort from this plan can be tremendous. The possibility of gearing and tooling up for production of an already outmoded product will thus be eliminated.

The design engineer, without facts about the military application, cannot determine whether he should develop a prototype of simple characteristics with broad tolerances that can be built cheaply by the hundreds of thousands, or whether the best military results will be achieved by the use of a small number of complex, costly, tight tolerance units, which are difficult to manufacture. The military, on the other hand, without adequate design and manufacturing information, would not know whether the requirements specified called for an impracticable and costly device or an easily constructed low cost unit.

There have been laboratory marvels that turned out to be manufacturing headaches and wound up as military flops. Operations research, as a method for establishing design limits and setting up project administration procedure, appears to be a logical approach to the solution of this problem.

Now let's branch out from the design boards into the field of communication: wire communication, as differentiated from wireless, or radio. Other than an Atlantic cable being laid to connect the U. S. with England, the year has not seen anything of a spectacular nature developed. Perhaps this is because the communications companies are service organizations and do not employ the large research staffs that other electronic companies do. But the fact that this cable is laid seems to be proof enough that radio is not yet recognized as completely reliable as a communication medium. This cable employs electronic amplifiers at frequent intervals throughout its length. These amplifiers are built right into the cable and are lying on the ocean floor. Their use will make possible the first trans-ocean voice transmission over long cable.

Tube reliability

Paradoxically, this cable (an infallible transmitter) has placed its trust in the reliability of vacuum tubes (whose reliability has been questioned). The tubes in use are supposed to have a 20-year life expectancy; nonetheless, failure of one tube could spell disaster.

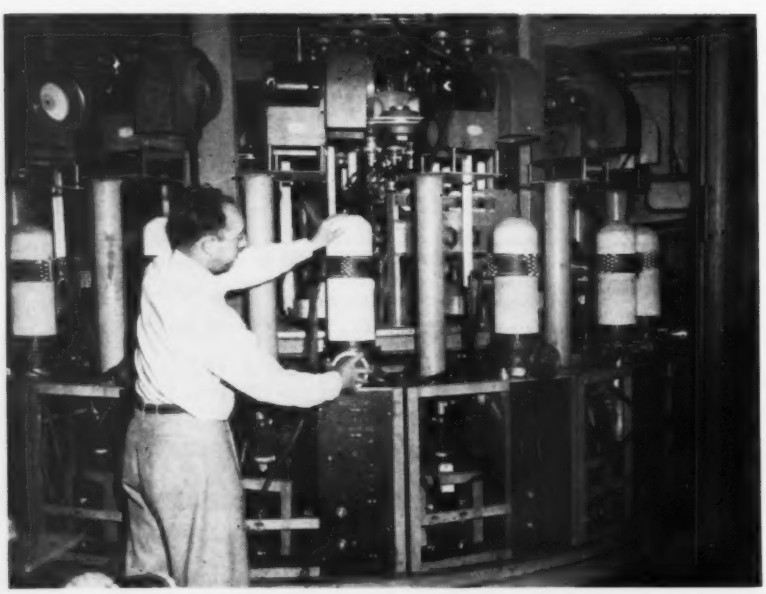
Communication, domestic and trans-world, might well receive a shot in the arm with the practical application of the principle of bouncing radio signals off from meteors, already known and practiced in a limited way. Successful long-range communication, unaffected by atmospheric variations, sun spot cycles, and seasonal changes, could become a commercial reality by use of this "bouncing signals" method.

Briefly, it consists of aiming the ulta high frequency signals (just as you might use a searchlight) at a layer of meteors which envelop the earth like a huge shell near the outer layer of the earth's atmosphere. This shell of meteors is always present and at a fixed altitude. Continuous, reliable communication has been maintained over a 1,000-mile range for a period of a year, using this principle.

Speaking of aerial things, the aircraft firms have stolen the march on the electronic industry, in the research field, in a manner of speaking. Even though radio is only a means to an end in aircraft manufacture, still the aircraft manufacturers employ far more people in electronic research than do the electronic manufacturers themselves.

An excellent case in point is Hughes Aircraft, in Culver City, Calif., where around 3,000 engineers and 5,000 others are employed in the area of electronic research. This makes aircraft electronics big business. The

CONSTANTLY IMPROVED electronic equipment as well as new materials and ideas pour out of research laboratories in the West. Here, an operator starts a load of Pyrovac anodes through its cycles on a 150 kw. rotary vacuum furnace at Eitel McCullough, Inc., San Bruno, Calif.



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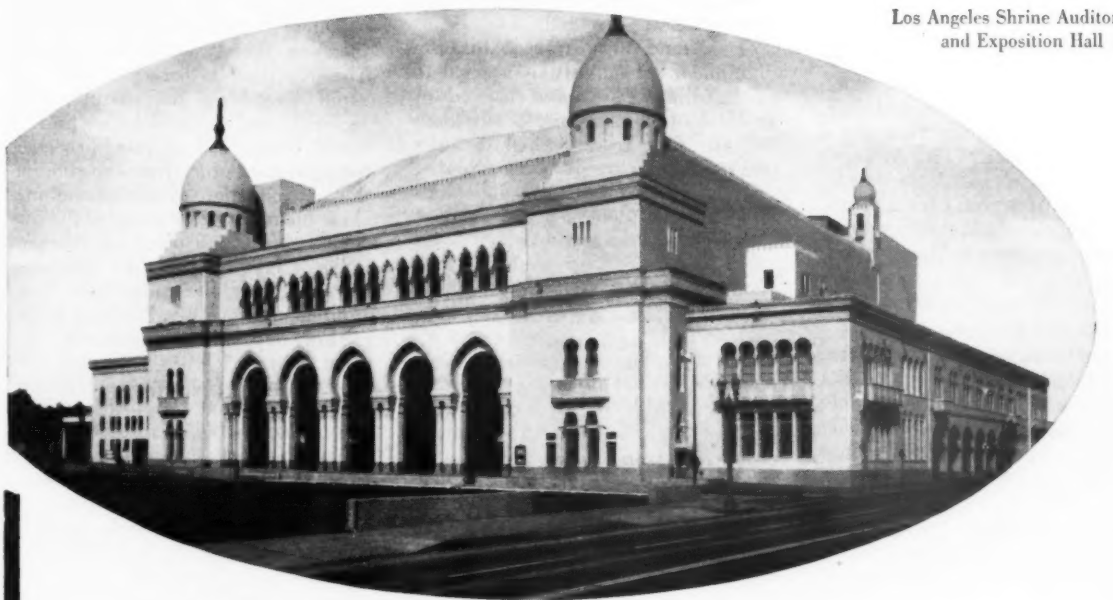

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reason? Simple: A large bomber now uses approximately 1,200 vacuum tubes in its complex circuits. An all-weather fighter uses some 700 tubes. In short, accessories, of which electronic devices assume a large part, consume about 50% of the cost of a modern aircraft. An ordinary modern-day fighter plane costs close to $1,000,000.

Progress in the design of aircraft electronic equipment seems to have turned from the stress on miniaturization to emphasis on reliability. Electronics (like Peace) is wonderful . . . when it works. Simplification is not the answer. Reliability is. A simple guided missile isn't worth the powder to blow it up if it won't hit a target. Complex functions will always require complicated equipment. The only way to be sure they will work is to produce them with built-in reliability. That is the answer and the goal.

Vacuum tubes are used to perform many of these complex functions, not always because the tubes are the only solution to the problem, but primarily because more people know more about vacuum tubes than they do about other devices.

Magnetic amplifiers, for example, may be able to perform some of these functions, but lots more time and experience must first be spent on developing them.

Western Outlook

FOUNDRIES

Competition keen, business slow, but 1955 viewed with some optimism by industry.

HEAVY gray iron casting work was still very slow at year's end, but some foundries were nearing capacity on light castings and the soil pipe foundries, favored by a renewed boom in building, were enjoying their best business in several years.

Activity along the West Coast generally ran from 50 to 80% of capacity, with military work down somewhat. But the downslide which darkened early 1954 was halted, and from May onward the outlook brightened. Much heartened by rising steel operating rates, Western foundrymen view 1955's prospects with cautious optimism.

Extra shifts nearly disappeared in 1954, but wage increases of some 5c per hour helped narrow profit margins. About the only overtime being paid was for hurrying up a rush job to please a customer. Customers were shopping carefully and competition was extremely keen, though order backlogs fattened steadily as the year wore on.

A new method of high-pressure molding, now being used in the East to achieve closer tolerances and reduce machining of castings, has stirred up a good deal of interest here, following technical reports on it at a convention in Cleveland.

The trend toward mechanization continued, particularly as applied to the handling of sand and shakeout of molds, as well as the use of skiploaders and fork trucks. Shell molding and nodular iron were being explored cautiously, with technical difficulties still limiting their use except in a rather narrow range of work.

Shipments of castings

(in thousands of short tons)
from Bureau of Census

	1951	1952	1953	1954 (7 mo.)
GRAY IRON				
Mont., Ida., Wyo.	13.4	10.6	9.2	5.2
Colo.	84.5	77.4	75.2	48.4
N.M., Ariz., Utah, Nev.	225.7	201.3	310.5*	115.2
Mountain states	323.7	289.4	342.4	170.6
Wash.	37.5	35.2	32.8	17.3
Ore.	28.4	24.9	26.7	15.5
Calif.	405.9	385.0	349.9	204.7
Pacific states	472.0	445.2	409.5	236.7
Total, West	795.7	734.7	752.0	408.4
STEEL				
N.M., Ariz., Utah, Nev.	9.2	7.7	**	8.6
Colo.	12.2	12.0	12.0	4.4
Mountain states	21.4	19.7	25.0	13.1
Wash.	15.7	18.1	16.3	9.3
Ore.	18.2	15.3	15.5	8.5
Calif.	76.9	67.3	64.9	29.1
Pacific states	110.9	100.8	96.8	47.0
Total, West	132.4	120.6	121.9	60.1

*Utah alone for 1953 is 235.2.
**Withheld to avoid disclosure of individual firms.

Non-ferrous foundries in Southern California seem to have been better off than most parts of the nation. Summer and fall months were good in general, and plumbing goods were exceptionally busy throughout most of the year.

High precision molding

Typical of the search for greater efficiency is a $100,000 revamping at Alcoa's Vernon plant to create a new plaster process department for high-precision molding, using a plaster molding method developed during work for Chrysler and Buick in the East. Advantages of the plaster molding method are said to be remarkable accuracy, reducing the need for machining, plus the ability to accomplish many jobs heretofore considered impossible. It also can be combined with other methods, permitting use of a composite mold of sand and iron to secure proper solidification sequence.

It has been said that the industrial center of gravity is shifting from the machine shop toward the foundry. This assertion is based on the very rapid growth of die casting, shell molding, and investment casting in recent years. Each of these processes has a primary objective—the elimination or reduction of subsequent machine operations as a result of the fine surface finish and precision inherent in the process itself. In some instances, machine shop operations have been eliminated altogether. Nothing in the picture appears to counteract this trend.

Pacific Northwest

Business in the Pacific Northwest during the past year was only fairly busy, but better than expected at the beginning of the year. Business was spotty, some foundries doing well, others doing poorly. By and large, demands for mill machinery are not what they once were, and of course the nearly 90-day lumber strike hurt business considerably.

Competition has stiffened somewhat, as evidenced by the fact that foundry equipment manufacturers are beginning to put their own men in the sales field rather than use already set up distributors. Prime examples are Whiting and Beardsley. From a long-range viewpoint, there is some optimism in the industry due to increasingly more dependable hydroelectric power and the future construction of a gas pipeline in the Pacific Northwest.

Foundries in the Northwest operated at probably less than two-thirds of capacity during the past year due to the general business dip and the lack of orders precipitated by the mill strike. Generally speaking, the Pacific Northwest gray iron foundries' three largest customers are Stactson-Ross Saw Mill Machinery, Continental Can Co., and Western Blower Corp. Some future business is expected from the two major refineries going into the area near Bellingham, but most foundry business will be concerned with maintaining production equipment.

The industry remained about the same size as during the previous year, but, the necessity to cut costs and the

increasingly competitive market have reduced the industry's employment considerably.

Mountain states

Steel casting production for 1954 was off about 40 to 50%, as there are only four foundries producing steel castings, one of which belongs to the Colorado Fuel and Iron Corp., producing only for their own repairs; of the other three, U. S. Foundry, Card Iron Works, and the American Manganese Steel Co., the latter has the largest capacity and produces primarily for the railroads and this business has been poor.

Iron casting production for 1954 was off probably 20 to 25%, although there has been considerable increase in the production of alloy irons and some in ductile iron. Non-ferrous castings are also considerably off.

Most foundries in this area are jobbing foundries, which do not lend themselves very readily to shell molding. However, the Hathawat Instrument Co. is using the process, and in addition makes precision aluminum castings by an ingenious method.

Foundry consumption of brass ingots

(short tons)
U. S. Bureau of Mines

State	1951	1952	1953
Ariz., Colo., N.M.	521	432	462
Utah, Ida., Mont.	43	21	5
California	20,188	16,172	19,152
Oregon	78	167	469
Washington	444	393	281
Total	21,274	17,185	20,369

Western Outlook

HEAT TREATING

Sales drop in the West in 1954 not as severe as in other parts of the country.

HEAT treating sales in the Western states suffered somewhat last year, but did not show as severe a drop as some other areas of the country. For the first nine months of the year, nine Western member plants of the Metal Treating Institute reported sales of $1,622,000, while for the same period in 1953 seven members reported $1,574,000. Sales in most areas dropped approximately 25%.

The coming year is expected by this young and rapidly growing segment of the metalworking field to show an increase over 1954.

Western Outlook

DIE CASTING

Aluminum and other non-ferrous castings showed gains while zinc dropped.

SHOWING a relatively strong position in comparison with national die casting production in 1954, the Pacific Coast Group of the American Die Casting Institute reports stepped-up fourth-quarter activity in all customer industries.

Aluminum and other non-ferrous die castings show a higher percentage gain in the West than nationally. Total national zinc die casting output was somewhat reduced, but estimated statistics for 1954 indicate that the Western group sustained a smaller drop in the volume of zinc alloy die castings.

Perhaps the most interesting development in 1954 in the West is the doubling in one year of the total production of certified zinc die castings than the rest of the nation. It is estimated that over 3,000,000 of the 4,500,000 lb. nine-month total Western zinc die casting sales were certified zinc die castings.

American Die Casting Institute members participate in the Certified Zinc Alloy Plan, a voluntary program whereby they submit production samples for checking by a recognized independent laboratory, to assure consumers of high physical and mechanical properties. A rigid enforcement policy maintains the CZAP so that manufacturers requiring metal components can assure quality by specifying zinc die castings with the CZAP seal.

West does better

Complete annual statistics will be available in February. Based on figures for the first nine months of 1954, however, Western die casters report only a 21% drop in total zinc die casting sales, compared to a national drop of 27%. In other words, the Western group dropped approximately 20% less than the national average. On the plus side, aluminum die castings output in the West was running about 6.5% above 1953 figures and other types were running about 4.0% above 1953.

Following the general economic trend in the nation, the die casting industry started off slowly in 1954. However, preliminary figures for the fourth quarter indicate a very active sales period.

Western Outlook

ELECTROPLATING

Nickel still in short supply. Electronics firms are installing their own small shops.

NICKEL for electroplating is still in short supply and probably will remain so at least until 1956. A system of self-imposed allocation by the West's three major suppliers is still in effect. An increase in stainless steel producing capacity is putting nickel in even shorter supply. More and more imported electrolytic salts are being imported, principally because the short supply of nickel on this continent has kept local production of these salts at a minimum.

Nickel is now the only metal still scarce in the West, with possible relaxation seen by mid-1956.

Marchant Calculating Machines and Prescolite have joined the ranks of Western manufacturers using automatic conveyorized equipment. They joined Schlage Lock and Friden. McClellan Air Force Base near Sacramento has ordered this equipment but has yet to put it into operation.

Experimentation on substitute finishes has come to an end for all practical purposes.

A hard chrome plating insulation for improving corrosion resistance has been installed at Yuba Manufacturing Co., Benicia. This is the largest facility on the West Coast and has been installed with sufficient flexibility to allow the plating of gun barrels up to 15 ft. long.

The decorative plating business is on the increase and revolves around finishing of automotive parts in still popular chrome.

The biggest trend in the past year has been the installation of small plating shops at Varian Associates, Eitel McCullough, Hewlett Packard, Sylvania Electric, and Litton. These shops are plating klystron tubes and other electrical equipment in order to extend their life. Gold plating is being used on vacuum tube grids and silver plating on base metals to improve surface conductance. This type of insulation is on the increase and probably will be adopted by a number of electronic manufacturers during 1955. Furthermore, these small plating operations are expanding within the plant.

Practically all electroplating supplies, with the exception of automatic conveyorized plating machines, are being produced on the Pacific Coast.

Western Outlook

PLASTICS

Business good in 1954, outlook even better. New materials developed for new applications.

BUSINESS was good in 1954 in almost every branch of the plastics industry in the West, and it is expected that it will remain good in 1955.

The increasing importance of the Western plastics industry and the optimism regarding its future are mirrored in the fact that a number of leading raw material manufacturers have established or are planning to establish new or enlarged production facilities on the West Coast for polyesters, polyethylene, polystyrene, etc. (Dow, Spencer, Monsanto, Reichhold, American Cynamide, Union Carbide and Carbon, Olin-Mathieson).

Further emphasis is given by several national events scheduled to take place in this region in 1955 (meeting of the Plastics Division of the Society of the Plastics Industry, World Plastics Fair and Trade Exposition, etc).

Some of the highlights in the Western plastics picture are provided WESTERN INDUSTRY by Felix C. Karas, vice-president of Mesa Plastics Co. of Los Angeles and publicity chairman of the Southern California chapter, Society of the Plastics Industry, as follows:

The material situation in the West parallels very much the situation in the rest of the country, especially in the East. Among the thermoplastic materials, polystyrene and polyethylene continue in their ever increasing acceptance in general, while nylon (zytel) expands especially in the commercial technical field. The thermosetting industry shows specialty materials such as alkyds, diallyl phthalates, silicones, etc., finding an ever increasing usage in the electronics, aircraft, and missile industries at the expense of the older conventional materials, such as phenolics and melamines.

To cope with tightening requirements for impact strength, humidity resistance, heat or cold exposure, etc., quite a number of specialty materials have been developed. They derive their enhanced properties not only from their improved polymers but also from their filler materials, such as glass fiber, orlon fiber, dacron fiber, special asbestos, etc.

The use of plastics in the packaging industry has expanded during the last year and will continue to expand during coming years. Clear rigid thermoplastics are used for containers, while films such as Saran, Pliofilm, etc., are used for wrapping. The prepackaging of fresh vegetables in film wrappers has become very popular. The increasing use of polyethylene for containers, squeezable bottles, etc., is worth mentioning.

Among the many effects of irradiation being studied at the present, the most interesting in the plastics packaging field is the possibility of cold sterilization of perishables packed in plastic containers or wrappings. If this process could be perfected, it would unlock an immense field of application that has not been touched as yet.

Western consumption

By JOHN WALSH

Arthur D. Little, Inc.

We believe that California accounts for about 10% of the plastic molders. West Coast consumption of polyester resin and fabricated parts is much higher, possibly 60% of the total, than in the rest of the United States due to the widespread use by the aircraft industry and the use of polyester-glass architectural sheeting in building construction.

Phenolic resin adhesives consumption on the West Coast may account for a major percent of the total because of its use in plywood.

Vinyl resin consumption is probably less than 10%, except for vinyl acetate used in latex paint for exterior masonry. There are six paint companies at present on the West Coast which make such paint.

The use of epoxy resin in the manufacture of tools and dies for the aircraft industry should increase rapidly on the West Coast.

The belief is being voiced that the estimate of a yearly consumption of 4,000,000,000 lb. in polythelyene material would be rather conservative if the canning industry would convert to the new process. The Western canning and vegetable packing industry is conscious of these new developments.

The fluorocarbons (Teflon, Kel-F) are continuing their advancement as more shops are learning to overcome the difficulties in molding and shaping these materials. Polyurethanes are establishing themselves in the West and are manufactured for a variety of end uses, including the padding of sporting goods (helmets, shoulder straps, ski shoes, etc.).

Incidentally, sporting goods also account for a very large part of the consumption of polyesters which go into boats, skis, saddles, etc. The epoxy resins last year again showed rapid growth in coatings, castings, imbeddings, etc. A plastic fiberglas golf club shaft manufactured in the West made a very successful debut last year.

The West a leader

The primacy of the West in the polyester consuming field is continuing. One-third of all the polyesters produced in the U. S. are consumed in the West. The aircraft industries are mainly responsible for this fact. It is said that the biggest polyester laminated aircraft parts (wings, assemblies, canopies, etc.) are made here in the West.

As far as the size of compression molded parts is concerned, it seems that the Middle West is holding the record with mammoth television cabinets. However, the West is not standing by idle. During the last few months, compression molded dresser drawers have appeared on the Western furniture market and have received such a good reception by the public that the whole available production has been bought up for the next few months by a national chain store and mail order house.

The good reception the general public gave plastic dinnerware has brought on a show of interest on the part of the ceramic industry very much conforming to the good old saying, "If you can't lick 'em, join 'em." The new year will see plastic dinnerware manufactured and marketed by long established and reputable ceramic companies.

In order to overtake the established plastic dinnerware lines, attempts will be made to use newer quality materials

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with enhanced stain-proofness and impact resistance. This situation is a repetition of what happened in some branches of the structural material industry or in the pipe industry. There, too, many old established manufacturers have entered the plastic field.

Another trend in the plastics industry important enough to be reported is the tendency of the major end users such as aircraft companies, electronic manufacturers, etc., to install captive shops to produce their own parts. These companies feel that they are in a better position to exert control over materials, molding procedures, scheduling, etc., affecting their parts which in many instances require an unusual high level of quality and precision. Several major end users also have greatly enlarged their plastic laboratories and die shops and have begun to develop independently the plastic components they require.

This might take away some business from the established shops. However, the opinion is voiced that the expanding activity in the industry will more than replace the expected loss. In fact, it is believed that this new development might contribute to a new surge in this field.

The past year saw a price fight among polyester resin manufacturers, with some prices falling below the 35c/lb. mark. It is not impossible that this downward trend will continue. In general, the raw material situation was quite stable. Price increases were sparse. The coming year might bring some price upturns because of increased manufacturing cost. However, the emergence of very low-priced phenolic materials manufactured in the West might tend to counterbalance this trend.

Fiberglas

Former production and sales records of the translucent fiberglas panel industry are likely to be broken in 1955. Each year has brought scores of new applications for translucent fiberglas panels, and 1955 will doubtless see a continuation of this market trend.

The industry expects substantial 1955 market advances in three major areas: (1) industrial glazing, where fiberglas panels provide cooler and more pleasant factory working conditions and solve the problem of window breakage; (2) the awning field, where striking new designs in fiberglas awnings are capturing consumer popularity; and (3) the shower door field, where shatterproof fiberglas panels are rapidly replacing glass panels.

Western Outlook

RUBBER

More Western rubber products going East. Aircraft and oil industries the largest consumers.

THE use of industrial rubber products in the West has increased faster than its population growth. The West has more users, but of greater significance is the fact that the West has more uses for the products.

In addition, there is a definite trend toward increased shipments of the product of the Western rubber industry to Eastern consumers. Clearly then, in the opinion of The Los Angeles Rubber Group's educational committee, of which John Ryan of Goodyear is chairman, the forecast is for a continuation of this expansion of production of industrial and mechanical rubber goods. (This report on rubber was specially prepared for WESTERN INDUSTRY by the above committee.)

Decentralization

The largest consumer of mechanical rubber goods in the West is the aircraft industry. Next in volume of consumption is the oil industry. The location in the West of much of the aircraft and oil industry has added impetus to the decentralization of plants by large rubber producers.

Western manufacturers of mechanical rubber goods are now more able to meet competition of Eastern suppliers. The growth of the wire industry on the West Coast has created a heavier demand for rubber and neoprene coverings and insulation. The development of neoprene paint products provides an outside maintenance coating of excellent durability. Natural and synthetic rubber bonded fibers are being produced for upholstery and insulation.

There is also the growing substitution of neoprene for natural rubbers. Synthetic compounds have replaced natural rubber almost 100% in certain applications where fuel and ozone are concerned. Over 50% of the market for oil seals has shifted from the use of leather flanges to synthetic molded organic rubber flanges.

Many molded and extruded products are being shifted from the use of organic rubbers to silicones for the latter's high temperature and low temperature characteristics. This entails in the end product a sacrifice of some of some of the other properties, abrasion resistance, tensile strength, etc., in order to get these much needed temperature characteristics.

This is partly true of rubber applications in aircraft where, for example, all of the many seals in one of the nation's newest and largest airplanes already flying with organic rubber throughout, are being converted to silicones. Each of these items forecasts a continued upward trend for the production of industrial and mechanical goods.

The development of new products and the resultant increase in production capacity is paralleled by the perfection of superior methods of fabrication of production items enabling the penetration of Eastern markets on a competitive basis. Methods of design of molds for transfer and injection molding has streamlined "O" ring production by eliminating costly trimming operations.

Special polymer outlook

The 1955 consumption of special purpose synthetic elastastomers on the West Coast is expected to increase approximately 20% over 1954 volume.

Generally, new materials are utilized in the aircraft industry initially, since requirements for such materials have originated in this segment of industry. This accounts for the consumption of 80% of the materials in the aircraft industry.

Silicones are being employed where extreme temperature conditions exist. Dielectric properties are also receiving increasing attention.

Hypalon, which exhibits outstanding heat and ozone resistance, is finding application in tank lining, out-door floor tile, and coating of athletic equipment.

New fluorocarbon polymers and silicones have made their appearance and as expected are being evaluated in the aircraft industry.

New rubber uses and population growth in the West give evidence of prosperity for the foreseeable future. Tire production statistics follow:

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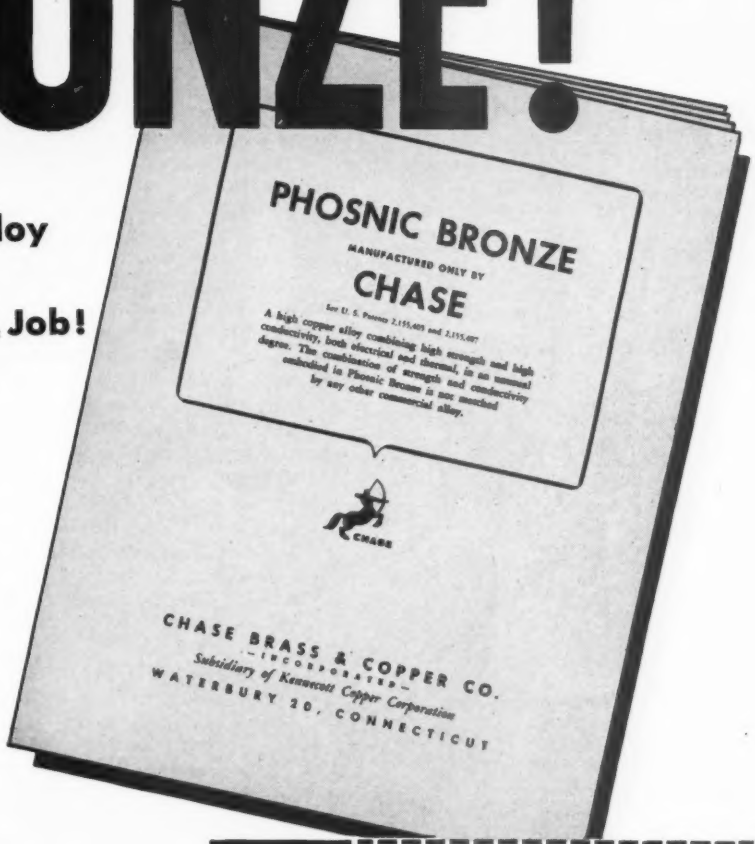
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Tire production

The industry estimate for consumption of all types of new rubber is:

1954 — 1,208,000 long tons
1955 — 1,250,000 long tons

New automobile production
1954 — 5,300,000 (est.)
1955 — 5,500,000 (est.)

New truck production
1954 — 1,000,000 (est.)
1955 — 1,100,000 (est.)

Thus, based on rubber consumption alone (not all of which is used in tires), passenger tire production should approximate 5% more in 1955 than in 1954.

Tubeless tires have entered strongly into the passenger tire picture. Following is expected production breakdown in 1955 of tubeless and conventional tires:

Original equipment—Practically 100% (except wire wheels)

Since older cars can be equipped with tubeless as readily as new ones, the forecast breaks down thusly:

Standard lines	Premium lines
75% tubeless	90% tubeless
25% conventional	10% conventional

Estimated passenger tire production:

1954 — 80,000,000
1955 — 84,000,000

Passenger tire sales are estimated to break down as follows for 1955:

Original equipment	33-1/3%
Replacement	66-2/3%

Estimated production volume of truck tires is:

1954—14,500,000
1955—15,500,000 (7½% increase)

Tubes

Tubes will take a drastic cut in volum due to tubeless tires. The cut will probably amount to around 60%.

Camelback

Per cent of truck retreads to new tire sales will run approximately 38% nationally, 50% in the Western states.

Per cent of passenger tire retreads to new tire sales will run 28% nationally. Winter retreading using camelback loaded with walnut shells, sawdust, and other materials along with high traction designs is developing a heavy volume in winter months in colder areas.

Tonnage for 1954—270,000,000 (est.)
Tonnage for 1955—285,000,000 (est.)

Foam rubber

Western volume for 1955 will be about 5,500,000 lb. for about a 5% increase.

Western Outlook

PAINT

"Do-it-yourself" doing well. Consumer sales growing. Record year for 1955 is expected.

TOTAL paint volume in the eleven Western states for 1954 apparently was at least equal to the record-breaking year of 1953, and 1955 may possibly prove to be another all-time high. This optimism is based on the belief that new construction, especially in Southern California, will continue at its present pace and that industry and Eastern company branch operations will continue to move West.

Also, the "do-it-yourself" market will be further exploited, especially for the repainting of the thousands of new homes built since the war. It is now estimated that three-fourths of all interior home painting and half of all exterior home painting is done by a member of the family.

Trade or consumer sales last year probably were close to 5% ahead of 1953, and industrial finishes sales off perhaps 5%. This compares favorably with the national average, which probably was 2% below 1953.

Dollar sales for the eleven Western states are estimated at approximately $220,000,000 annually.

High freight rates and higher raw material costs in the Far West still preclude the Western manufacturers from expanding their market beyond the Rockies. However, there has been a tendency for Southern California products to move north.

As summarized for WESTERN INDUSTRY by John V. Vaughn, president of Sillers Paint and Varnish Co. of Los Angeles, and regional vice-president of the National Paint, Varnish, and Lacquer Assoc., here are some of the notable features of the Western paint situation:

The merchandising of color and the offering of a wide selection of colors continues to be the most effective merchandising tool of the industry and the West maintains its leadership in this.

All of the important raw materials were in good supply last year and no shortages are anticipated in 1955. More instances are showing up, especially on newer and higher priced products, of equalizing Western and Eastern prices.

There is no problem of under-capacity. Several large production facilities for alkyds and copolymer type vehicles were completed in 1954, which would lead to the conclusion that the paint industry is quite optimistic about the future need for its products and the certain continued growth of the West.

Paint men are becoming more and more conscious of the fact that especially in the consumer field, much more can and should be done through merchandising and promotion to make the buying public more paint conscious.

The recently announced policy of the Navy to discontinue its manufacture of paint products should materially help the industry, especially the Western manufacturers, since the Mare Island Navy Yard has been a primary producer of paint for the Navy.

Technological advances and the utilization of totally new and different film forming raw materials and new ideas of merchandising are changing the complexion of paint making and marketing from day to day. It is readily admitted by the rest of the country that the West, and especially Southern California, is the birth place of many of these important advancements. Many, of course, are of a specialty nature, but once finding a foothold in the West, they soon reach the Eastern markets.

Some of these are multiple color systems, texture paints, fabric coatings, redwood finishes, chemical resisting coatings, and the two- and three-color "splatter" type finishes for both interior and exterior. The aggressiveness and creativeness of the West is readily recognized throughout the country.

The trend in finishes is definitely away from straight process oils or other raw drying oils to more durable quicker drying synthetics and water dispersible resins. Alkyd base paints are still the most popular, although water phase paints are a strong contender. The latex emulsion paints for interior use have not found quite the market in the West that they enjoy

throughout the rest of the country. Odorless alkyd flat, semi-gloss, and gloss seem to retain an edge in popularity.

In the West the most talked-about new coating in 1954 was polyvinyl acetate, which seemed to find a ready acceptance, replacing the more conventional coatings for exterior stucco and masonry. The P.V.A. curve has now leveled off somewhat, being replaced with butadiene styrene, acrylics, and alkyds, and modifications of all of them.

There is no doubt, however, that water paints as a general class will become more popular next year for exterior masonry surfaces. Much work has been done to adapt these emulsions for exterior wood surfaces, but it is unlikely that 1955 will see them offered for such use to any extent.

While these emulsion paints have considerable merit and appeal, they are still far from being foolproof. But considerable progress has been made by the chemists during the past year and work will continue toward perfecting these new coatings.

A great deal of research work has been done on alkyd base flat paints for exterior wood and some are already available for shingles.

Much thought is being given to the epoxy resins which have found ready acceptance in the industrial finishes field, and the time may not be far off when these may be made available to replace alkyds on an odorless basis.

Application methods and tools have apparently not kept pace with the new developments in paint. The brush is still standard equipment, but for home use the roller has gotten a strong foothold. More and more products are now being packaged in aerosol cans and the use of these is expected to increase further.

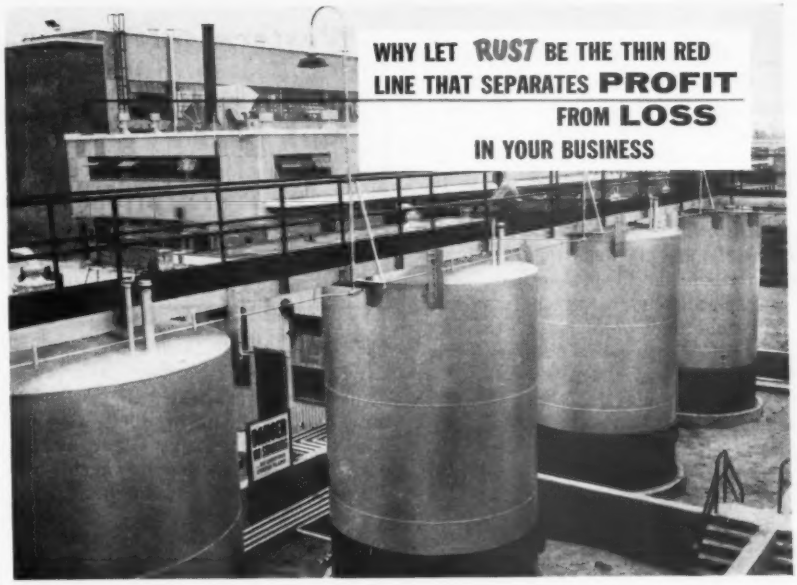
Western Outlook

GLASS

California, with 12 units, has more glass container plants than any other state.

WITH twelve important units, California has more glass container plants than any other state, and a sizable portion of the country's total output of glass containers—dollar value of which amounted to some $700,000,000 in 1954—are California-made.

The principal raw materials of glass



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are sand (largely silica), soda ash (sodium carbonate), and limestone for hardening. The white sands of the Del Monte peninsula are now widely used by California glass makers. Soda ash is processed at chemical plants in Death Valley area and elsewhere in the state.

California sand, soda ash, and limestone are all of particularly high quality, and shortages appear unlikely for as far ahead as anyone can see, indicating that problems of California's pioneer glass makers have been more or less permanently solved.

Processed baby food has steadily reflected the trust consumers place in glass. In 1939, only 13% of baby foods were packed in glass. By the end of last year, well over 60% came in glass.

The spectacular success of soluble coffee is another example of the many food products which have benefited from the functional advantages of glass. Instant coffee sales have quadrupled since 1946, with the greater part glass-packed.

Western Outlook

PIPE

Cast iron soil pipe production hits 60,000 tons. Outlook for coming year good.

AS the West grows, so does the pipe business. Production of cast iron soil pipe in the Western states was up in 1954 and is estimated at possibly 60,000 tons. The building program enabled all the producers to work at capacity since early last spring, and the forecast for another good building year in 1955 gave them confidence to do the same through the fall when the industry ordinarily cuts back production to offset the declining demand during the winter months.

The Cast Iron Soil Pipe Institute announced last September its new "C.I." standards and a corresponding seal to be used on pipe and fittings which conform to the new regulations. The products are standardized in two weights, service and extra heavy, as compared with four weights previously used by many manufacturers. The system helps to standardize, thus reducing inventories.

Outlook for cast iron pressure pipe in 1955 as reported by the Cast Iron Pressure Pipe Institute is good, and the volume of both water and sewer construction should be greater percentagewise in the Western states than most other areas.

Western Outlook

CHEMICALS

West now producing all principal chemicals needed for its markets. Expansion continues.

THE West's chemical industry has passed the stage where it was predominantly concerned with argicultural and petroleum products, and is now reaching the stage where equal interest in other organic chemical products is being shown by such companies as Monsanto, Union Carbide, and Olin Mathieson, new to the West as producers. These companies are attracted by petroleum hydrocarbons, ammonia, other heavy chemicals, and forest products as raw materials.

All the principal chemicals needed to serve the Western market are now being produced in the West, or will be. Ten or 15 years ago the total volume of chemicals produced in the West was substantially below its share of the Western market in relation to population, and far below its proportionate share of the national market. These percentages will be more in balance in the near future, particularly when exporting out of the area a significant portion of the West's production becomes a reality.

The industry continues to concentrate on the conversion of the following raw materials to finished end products:

Petroleum, natural gas, coke, cellulose, lime, phosphatic shales, barite, many salines including solar salt, lithium salts, borates, bromides, potash, iodine, and trona.

Completion of two new oil refineries on Puget Sound, with possibly others to follow, is likely to result in the growth of chemical plants in that area which will compete with those in California.

DuPont's announced plan for a tetraethyl lead plant somewhere in the San Francisco Bay area leads to the conclusion that it will be a very large operation, as the Western market for this product is around 90,000,000 lb. a year and the raw material requirements for metallic sodium, chlorine, ethylene, and bromium will be correspondingly large.

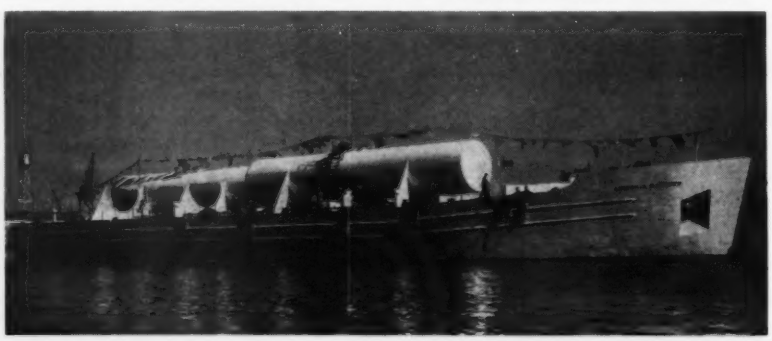
The expanding agricultural market in the Columbia Basin has caused Brea Chemical Co. to tanker aqua ammonia north from California, while the inauguration by Shell Chemical of barge service of ammonia to the Pacific Northwest promises to be the initial step in developing a service comparable to the barging which has meant so much to the chemical development of the Gulf area.

Columbia-Geneva Steel at its big mill in Utah will produce synthetic ammonia from hydrogen manufactured by cracking the coke oven hydrocarbon gases which have hitherto been burned under the ovens. This is believed to be the second installation of its kind in the country and will supplement the standard steel industry practice the company already had been following in producing ordinary ammonia.

Other developments include the following:

Ammonia: Brea Chemical completes facilities at Brea; Hercules completes expansion at Pinole; Hooker expands

SHELL CHEMICAL CO.'s new barge, built by Bethlehem Pacific Steel Corp., transports anhydrous ammonia from Pittsburg, Calif., to Portland, Ore., for farming and industry in the Northwest.



at Tacoma, Utah Chemical at Mt. Pleasant, Utah, Ammonia Chemical Corp. at Oleander, Calif., and Columbia River Chemical Co. at Pasco, Wash., hold governmental certificates of necessity to build ammonia plants, but no construction is under way; Salt Lake City Chemical Corp. is reported due to build at Salt Lake City. (It is considered doubtful whether any of these four plants will be built.) Consolidated Mining and Smelting Co. will reportedly construct facilities in Oregon.

Ammonium phosphate: Brea completes liquid ammonium phosphate plant at Brea, with similar units to be built at Fresno and Brawley; Best Fertilizer facilities at Oakland nearing completion; Stauffer completes Tacoma plant and its associate company, Western Phosphates, completes plant at Garfield, Utah.

Superphosphate: Hughes - Johnson Co. Portland, reported planning to build normal superphosphate plant using continuous funnel-type mixer; Simplot completes triple superphosphate and ammonium phosphate facilities at Pocatello, Idaho; Stauffer has announced expansion at Vernon, Calif., for pelletized superphosphate; Western Phosphates, Inc., expanding recently completed plant at Garfield, Utah, for phosphoric acid and triple superphosphate; Jefferson Lake Sulfur Co. announces plans to build large triple superphosphate plant in southeastern Idaho.

Construction

Western chemical industry construction for the 12 months ending October 31, 1954, is reported by the Manufacturing Chemists Assoc. as follows:

(in $1,000)

	Completed	Under construction	Planned
Arizona	...	...	$ 3,000
California	$41,415	$ 86,800	45,425
Colorado	35,000	4,000	500
Idaho	3,000	4,000	5,000
Nevada	...	200	20,000
New Mexico	7,000	...	20,000
Oregon	2,650	...	1,175
Utah	5,000	10,800	23,650
Washington	1,650	21,100	355
Wyoming	2,500	20,000	...
	$98,215	$146,900	$119,105

Anaconda Copper Mining Co. will complete a sulfuric acid plant at Anaconda, Mont., this month which will permit increase in triple super and phosphoric acid there. Brea Chemical plans an ammonium nitrate-nitric acid plant as the next expansion in fertilizers at Brea, Calif.

Oronite Chemical Co. is going forward with its plans for a $10,000,000 isophthalic acid plant at Richmond, Calif.

International Minerals and Chemical Corp. has a new plant near Carlsbad, N. M., which utilizes what was formerly waste liquor to recover magnesium oxide and hydrochloric acid. The magnesium chloride liquor is used as effluent in a process in which potassium chloride is reacted with langbeinite in a chemical plant to produce potassium sulfate.

Western production of chlorine and sodium hydroxide continues to increase.

Western output

from Bureau of Census

	1951	1952	1953
Chlorine gas (tons)			
West	284,004	262,594	270,011
Sodium hydroxide (short tons of 100% NaOH)			
West	309,552	273,383	298,505
Sulphuric acid, new acid (tons of 100% H_2SO_4)			
West	984,075	951,928	1,051,435

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Western Outlook

CEMENT

Going was slow in 1954 but irrigation, highway programs can bolster business.

PORTLAND cement business experienced slow going for the first six months of 1954 as a result of the change of administration which affected federal projects in general and the Central Valley Project in particular. The result of this lull pushed business for 1954 a little below that for 1953. Best informed men in the industry expect 1955 to be a little better than 1954 and foresee a much better year for 1956, when the recently announced road building program will be under way.

This proposed $11,000,000,000 highway program would, according to the American Road Builders Assoc., require California to supply some 10,418,000 bbl. of cement to their part of the program. This would mean taking nearly 30% of the present production for a part of the business that normally requires less than 20% of cement production. This points up a shortage of production capacity in the West that is likely to become increasingly more important.

Although California is in short supply, particularly in the southern part of the state, the ready-mix producers are not doing very well. This is because they don't get in on the really big jobs which eat up the bulk of the cement and contribute the most to an overall shortage.

California Portland Cement Co. is building a new plant near Mojave, Calif., and Southwestern Cement Co. is planning a new kiln at their Victorville, Calif., plant. Monolith Cement Co. expects to increase its capacity at Bakersfield, Calif., and U. S. Cement Corp. has announced its intention of building a new plant at Perris, Calif. Arizona Portland Cement Co., a subsidiary of California Portland Cement Co., has installed a new kiln to increase its capacity by 50%. Almost all Western companies have continuous modernization programs under way which are designed to increase efficiency and production.

Permanente's use of bulk carrier steamships and barges to supply their distribution plants in Honolulu, Portland, Seattle, Anchorage (Alaska), and East Pasco, Wash., refutes the old cement industry adage that a cement plant can only sell competitively within 200 miles.

Western Outlook

TRUCKING

Westerners enjoyed a good year while nation's tonnage fell approximately 6%.

TRUCKING in the West in 1954, in general, had a prosperous year. Not that tonnages leaped ahead of the 1952-1953 record highs, but Western truck lines maintained these figures in 1954 while national tonnages dropped some 6%, and rail freight was considerably off.

The stop in available freight in the nation was probably due chiefly to adjustments in the economy resulting from peace in Korea, and now that this is over the trend should be up again, especially in the West where increases in population and industrial activity continue their upward swing.

Shippers should expect increasingly better service from the trucking industry in 1955. Probably the basic reason for this is competition within the industry. The necessity to strive for faster, more dependable service will result in such things as an improvement in equipment, changes in operations to cut transit time such as the shift to sleeper cabs, and increased use of radio in city pickup fleets. As the Western states continue to expand their divided-highway construction programs, over-the-road time will improve to the benefit of shippers and their customers.

Construction of new terminal facilities and office buildings by Western truck firms during 1954 was heavy and has been since the end of World War II. Indications are that the industry as a whole will not build as much in 1955, although one major cross-country carrier has announced a million-dollar project for the Los Angeles area. However, again competition may dictate the future, as modern terminal design has improved the handling of freight on the dock and many operators may be forced into modernization programs.

"We have gone through a shakedown period, from a wartime economy to a peacetime situation, and our industry is on firm ground with inventories down and capacity up, ready to take full advantage of the favorable climate of 1955 and the future years," reports John C. Bennett, president of Utility Trailer Co., Los Angeles, Calif., and national president of Truck-Trailer Manufacturers Assoc.

He stated that the trailer industry produced around 53,000 units in 1954, with a total dollar value of $240,000,000. This includes production of 10,000 non-civilian (military, other government, and some export) units. Production of non-civilian units was about 36,000 less than in 1953.

Although 1954 total production and shipments were 45% off from 1953, dollar value of truck-trailer shipments were off only 19%. This was occasioned by the fact that production and shipment of 1953 included a government demand for 44,516 units.

The trend toward aluminum van-type trailers continued in 1954, and manufacturers made almost twice as many aluminum as steel vans.

Western Outlook

SOAP

Aggressive promotion helps Western producers battle the still gaining detergents.

PROPELLED by a steady population growth, the West's soap industry defied reactionary tendencies and after a dull second quarter faced 1955 on the upbeat.

In the battle with detergents, soap was holding up better on the Pacific Coast than in any other U. S. area, influenced doubtless by more aggressive promotion. But detergents continued to gain ground everywhere, having already captured the major share of the household market. For industrial uses, soaps and detergents were running neck and neck.

Smaller manufacturers found competition exceedingly keen in the face of the tremendous barrage of radio-TV laid down by the industry's giants, all of whom now operate their own West Coast plants. A good deal of retrenchment was under way, with considerable mechanizing of materials handling in plants.

Housewives now use about 80% of their soap and detergents in powdered form. The long campaign to convince them that suds are not necessary to washing has finally created a trend toward non-sudsing detergents.

Estimates of the use of chemicals by soap manufacturers in the Southern California area, indicating the trend toward synthetics, are as follows, in tons:

Raw material	1940	1953	1965
Caustic soda	5,000	20,000	25,000
Sulfuric acid	1,000	16,000	20,000
Polyphosphates	....	40,000	50,000
Soda ash	6,000	6,500	7,000
Sodium silicate	6,000	10,000	12,000
Alkyl benzene	....	9,000	13,000

Western Outlook

FERTILIZER

The West's sales went up while the nation's dropped. California is the big user.

WHILE the 1953-54 national volume of fertilizer sales declined 312,889 tons from the previous year, sales in the West were up 66,735 tons. California accounted for 26,808 tons of this gain, Oregon 25,344 tons, Arizona 16,000, and Idaho 5,000. There were other minor gains in the West, but Colorado, New Mexico, Nevada, and Washington all had slight decreases. For the first three quarters of 1954, California had a gain of 15,831 tons.

California is by far the largest user in the West, with 803,519 tons for the 1953-54 year. Oregon ranked second with 155,374 tons, Arizona third with 126,535, and Washington fourth with 91,159. Figures are from the National Fertilizer Assoc.

The California Fertilizer Assoc. points out that California farmers and other plant food consumers are using more than before in spite of the arbitrary reduction of cotton acreage from the 1953 level of 1,348,000 acres to 907,000 acres in 1954, a difference of 441,000 acres. The association reports that most of this acreage was diverted to other crops to improve pasture, corn, vegetables, oil, and seed crops.

A buyer's market developed in the United States potash industry during the past year, and for the first time this country has a surplus of this plant food, of which New Mexico produces more than 90% of the nation's output.

The New Mexico potash industry is comparatively young, but it has grown big and is still growing. Mining and refining operations started during the depression years of the early 1930's with a single mine. Now there are five big producers turning out almost 2,000,000 tons of refined potash a year, and a sixth company is entering the field.

Operating companies are United States Potash Co., Potash Company of America, International Minerals and Chemical Corp., Duval Sulphur and Potash Co., and Southwest Potash Corp. Freeport Sulphur Co. completed its explorations in 1954 and is planning to start construction of a $15,000,000 mine and refinery in southeastern New Mexico in January 1955.

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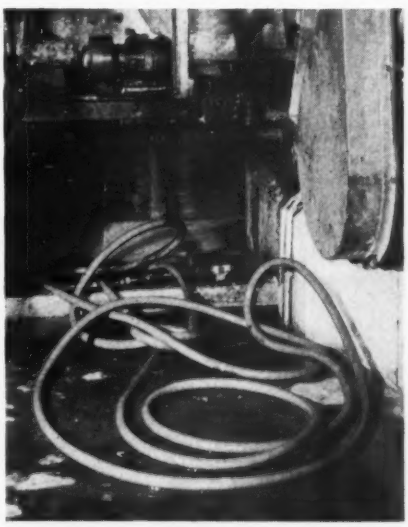

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Western Outlook:

RAILROADS

Streamlining of equipment, improved communication, better service characterize Western roads.

WESTERN railroading in 1954 was characterized by improved materials handling, a shift towards lighter equipment, greater and more widespread use of piggy-back facilities, the use of radio, radar, and other electronic equipment, purchase of dome cars and diesel locomotives, and the modernizing of repair and maintenance facilities.

Southern Pacific

Estimated value of shop equipment used for locomotive and car repairs in the eleven Western states as of the end of 1954 was $120,000. The change from steam to diesel power has materially affected the type of shop equipment used. Diesel locomotives require such equipment as wheel truing machines now in use at Roseville and Los Angeles, Calif. Parts for diesel locomotives are purchased and stocked as finished material, while steam engine parts are often manufactured especially for the job.

There has been continued installation of radio communications equipment for use between head-end and rear-end of trains, from fixed stations, on ferry boats, on snow fighting equipment, and in yards. Remote controlled or fully automatic radio repeater stations have also been installed to project radio messages greater distances than originating stations can cover.

Southern Pacific transportation system has a total of 175 flat cars equipped for use in trailer flatcar (piggyback) service. Early this year an additional service of this type will be established between Los Angeles and the Pacific Northwest, and an additional 48 flat cars will be equipped for use.

Consideration is being given to possible future use of demountable bodies and longer cars. In the past year the tie-down equipment on flatcars has been changed to permit handling of 22 and 35 ft. vans. Stanchions previously used to support vans on the cars have been eliminated and the vans now rest on their own tires.

The transportation system's trucking operations cover approximately 20,000 route miles and use about 2,400 units of equipment. SP's long-range plan is to expand trucking operations to where it can improve its service. In this regard it has made application before the ICC and various state commissions to acquire operating rights and equipment of some truck operators serving California and Arizona. Approval of these applications would result in an increase of about 5,000 miles and 1,600 units of equipment.

Union Pacific

During 1954 Union Pacific built $8,000,000 worth of new yard facilities, greatly increased the number of diesel and gas turbine locomotives, and will soon have a fleet of new Astra Dome passenger cars in service.

New yards began operations in September at Ogden, Utah. These were built at a cost of $4,000,000 for the Ogden Union Railway and Depot Co. and the Pacific Fruit Express, both jointly owned by the Union Pacific and Southern Pacific railroads. Into the projects went the Ogden area's largest investment of private capital in a half-century.

Twenty-two miles of new track were constructed and icing platform facilities were increased for the Pacific Fruit Express.

Work progressed during the year on new yards at East Spokane, Wash., to cost an estimated $2,755,000.

Pacific Fruit Express ordered 200 mechanically operated "Super Giant" refrigerator cars during the year, bringing to 337 the total of this type of equipment in service or on order.

Great Northern

Great Northern Railway has $775,000 invested in repair shops in the West. New equipment is being used for equipping flat cars for piggy-back service: Air Slide covered hopper cars are being used for bulk flour service; and new equipment is being used in the field of mill type open-end gondola cars.

With the increasing use of diesel units, overhaul and maintenance practices have been revised somewhat. Engines and generators are removed intact, replaced by complete spare units rather than making partial repairs. This increases the availability of the unit and reduces repair costs.

A freight checker system will be installed in the freight house at Seattle, and another has been authorized for a freight house at Great Falls, Mont. Motor generators to develop power for telegraph and other communication circuits at Great Falls have been replaced by selenium rectifiers.

Great Northern's first piggy-back service was begun between Minneapolis and St. Paul and other eastern points in 1954. Some extension of this service, to other portions of the railway, is expected to take place during 1955.

The railroad is making use of carrier telephone and telegraph systems which are, in effect, wired radio transmitting sounds by electronic means. Also in use are electronic sorters, sorting cards bearing various kinds of data; electronic calculators which determine answers in relation to data they process; and electronic machines which handle iron ore car weighing and process resulting data.

Great Northern has its own trucks and freight service in Montana on routes that parallel most of its rail lines in that state. This is the only state having a Great Northern-owned truck service. All trailers used in piggy-back service are leased, not owned outright. Tractor service for pulling trailers to and from receivers' and shippers' places of business is provided by contract haulers. These firms also move the trailers on and off the railroad's flat cars.

Santa Fe

Santa Fe now has 12,024 route miles of trucking operations, including Santa Fe Transportation Co., operating wholly within the state of California. Combined operating revenue for the first nine months of 1954 was $9,162,281 compared to $8,935,720 for the same period in 1953. At present there are 344 straight trucks, 450 tractors, and 663 semi-trailers.

Trailer-on-flatcar freight service between Los Angeles and San Diego was started in late 1954. Lot shipments of certain commodities are picked up in Los Angeles or San Diego and delivered the next day. Freight pickup and delivery is made by truck trailers 24 ft. and 32 ft. in length, and flatcars equipped with special hold-downs carry either two 24-ft. trailers each, or one 24-ft. and one 32-ft. trailer. A cable tie-down system of fastening is used.

Western Pacific

Dollar value of shop equipment in-

stalled on Western Pacific lines in the West in 1954 was $50,300. An additional $25,000 worth of materials handling equipment and machine tools is to be installed in repair and maintenance shops in 1955.

An effort is being made to reduce labor costs through the use of improved materials handling equipment and methods. There is a tendency toward more light machines such as grinders, drills, and pipe threaders to be located at strategic points to reduce lost time and materials handling. Labor saving devices are being installed to make more efficient the maintenance of diesel equipment. Included are fork lift trucks, palletizing of materials, and power tools and equipment.

The company's modified centralized traffic control was replaced during 1954 with a completely centralized traffic control on the first subdivision between Oakland and Stockton, Calif. Scheduled installations for 1955 include: installation of locomotive cab-caboose radio; relacement of the present San Francisco-Salt Lake City two-channel telegraph carrier circuit with a new modern system; and a centralized traffic control on San Jose branch between Niles and San Jose to better handle traffic to and from the Milpitas industrial area.

Western Pacific has not yet installed piggy-back service, but ways and means of doing so will be under investigation during 1955.

Northern Pacific

Estimated dollar value of shop equipment installed in the eleven Western states as of 1954 was $177,000. Prospective additions to this equipment for 1955 will bring the total to $207,000.

Centralized maintenance is being carried out at larger installations, since fewer maintenance points are required for diesels than for steam locomotives.

New lightweight passenger cars are being equipped with outside swing hanger trucks with large control bearings to give a smoother ride. All new cars are equipped with electromechanical air conditioning units and all passenger cars come equipped with loudspeakers so that tape-recorded music, radio, and train announcements can be broadcast throughout the train over a specially designed high fidelity sound system.

Radios were installed on all new road diesels acquired in 1954, and teletype operations were expanded. In 1955 NP plans to extend its wayside-to-train radio communications on the Tacoma division and contemplates installation of yard and terminal radio facilities at some Montana stations.

A medium all-purpose electronic computer is used in the car accounts department to compile operating statistics and the accounting department also uses an electronic computer in the compilation of freight and passenger statistics.

As yet, Northern Pacific has no piggy-back service in the West, but the company expects to expand this service some time in the future. Northern Pacific Transport Co. a subsidiary of the Northern Pacific Railway, has extensive operations in Montana with smaller operations in Washington and Idaho.

Milwaukee Road

For the year 1954 the Milwaukee Road spent approximately $600,000 for shop machinery and tools. Included in these purchases were two wheel truing machines costing $150,000 each. The budget for 1955 calls for expenditures of about $255,000 for shop machinery and tools.

Latest additions to the diesel fleet are a 1,750-hp. Electro-Motive road transfer locomotive and a 1,600-hp. Fairbanks-Morse locomotive.

Among 1954 developments were two-way radio installations in ten diesel locomotives in yard and terminal service, in ten diesel locomotives in road service for end-to-end and waystation-to-train communication, and in the base station for yard and terminal service.

Other communications and control devices included: (1) Three channel carrier telephone and telegraph system installed between Miles City, Mont., and Plummer Junction, Ida., which completes the three channel carrier system Chicago, Ill., to Seattle, Wash., and intermediate points. (2) Single channel carrier with speech-plus carrier telegraph equipment installed between Spokane, Wash., and Seattle, Wash. (3) Speech-plus carrier telegraph system installed between Aberdeen, S.D.-Miles City, Mont., and Miles City, Mont.-Butte, Mont.

Approximately $500,000 was expended for roadway machinery and roadway work equipment. The program is mostly one of replacing worn-out equipment.

Developments scheduled for 1955 include two-way radio installations in 32 cabooses for end-to-end and waystation-to-train communication, and twelve diesel locomotives in road service for end-to-end and waystation-to-train operation.

Other communications and control devices planned include: (1) Installation of four channel carrier telephone and telegram system Seattle, Wash., to Tacoma, Wash. (2) Installation of single channel carrier telephone system Spokane, Wash., to Othello, Wash. (3) Installation of portable type high frequency carrier communication equipment Tacoma, Wash., to Taunton, Wash. (4) Installation of teletype printer equipment at Seattle, Wash.

Ed. note: Space limitations prevent a detailed report on new equipment received in 1954 or ordered for 1955.

RAILROAD YARD OFFICER uses industrial TV to follow car movements at SP's Los Angeles yards.

Western Outlook

LUMBER

Competing materials spur Westerners to more efficient operation, land use, selling, and promotion.

DESPITE a strike that crippled industry in the Northwest during the summer months, the lumber industry finished 1954 in good health; and with construction prospects for 1955 bright, a very good year for the Western lumber industry is forecast.

The past year was characterized by an increasing interest in the effective use of promotion, public relations, and advertising. This growing awareness of the need to satisfy the customer efficiently, and at the same time to compete against encroaching substitute materials, is helping the industry a great deal. They are selling a lot more lumber to a more competitive market simply by applying proven principles of merchandizing.

Production of all species in the Western pine region (all the West except the Douglas fir forests of the Pacific Northwest) was 7.8 billion fbm. in 1954. This compares with 7.5 billion in 1953, which shows a substantial increase, particularly since there was an estimated loss of production of 150 to 200 million feet during the nearly 3-month long strike.

Many experts expect a record home construction year in 1955, which might very well push production in this area to 8 billion fbm.

At the present time, 70,000 schoolrooms per year are needed and a backlog is continuing to build up. There is a trend from masonry school buildings, often obsolete before they are worn out, to single story frame buildings which can be modified, expanded, or added to. A one-story building gives greater flexibility, better lighting, lower costs, and safer operation. There were more churches and religious buildings built in 1954 than ever before. Many of these made use of newly developed laminated structural members.

The size of the lumber industry in the West remains about the same, with the usual numerous additions and subtractions. There has been more mill construction in California during the past year than in many previous years as operators reach deeper into red firs and pine growing at higher elevations. White fir, not long ago a weed species, is being cut quite heavily in California, and this alone has pushed California into second place in lumber production. At the present time, in the West, 1,200 mills make up 30% of the production, 250 make up the other 70%, and the smallest 900 mills produce only 11% of the West's production.

A GIANT redwood log is fed into the head saw at Pacific Lumber Co., Scotia, Calif. Pacific has been a leader in developing ways to utilize the fibrous redwood bark, formerly wasted.

Since about 58% of Western forests are owned by the government and the remainder are owned by the larger timber companies, small and moderate size users are forced to buy government timber on government terms. Government contracts have become more and more difficult and this, combined with the heavy competition for accessible lands, pushes stumpage prices out of reach of the small operator and gives him very little control over his raw material source.

Stumpage costs have gone so high that the small operator cannot afford to cut his logs for what are usually considered salable grades of lumber. As a result, a new raw material concept has come into being. This concept, similar but not nearly aproaching the economy practiced in European forests, consists of cutting the log for the maximum number of board feet, whether they be high or low grade pieces. Operators and associations have banded together to promote the use of 2,000,000 bd. ft. of grades 3 and 4 during 1954 and more of the same is expected this year.

Forestry

Forestry practices concerned with the science of managing forests for continuous production of wood are gaining wider and wider acceptance both by management and in the woods. Forestry is being applied in an effort to produce more timber on each acre. This has led to experiments in brush control, planting, seeding, predator control, and other practices designed to produce better quality timber.

For the most part, large owners in the Western pine region are managing their lands under tree farm standards. To be certified as a Western pine tree farmer, an owner must comply with state forest practice laws and tree farm standards of forest practice. This industry sponsored movement has resulted in private lands being very often more intensively managed than public forests.

Many smaller operators, too, are managing their forests for continuous production. The Western Pine Assoc. has certified nearly 200 tree farms covering one-third of a million acres in 1954, mostly in the small ownership class with mills, farmers, ranchers, and others represented. In total there are 643 tree farms covering 5,500,000 acres in the Western pine region. The expanding tree farm program now includes nearly 50% of privately owned forests in Oregon and Washington.

Statistics of the recently conducted American Forests Congress survey will be released early this year. They are

expected to show a considerable increase in timber volume for the West over the 1945 estimates.

Salvage logging

By far the greatest problem facing Western lumbermen today is that of utilizing overripe, overmature, and dead trees. There is an estimated yearly loss of 3 to 4 billion board feet through these causes alone. Until government contracts make it possible to "salvage-log" on over-mature government lands without a great deal of red tape, this loss will go on.

Prompt salvage of this potential volume continues to be the only way to get dead and dying timber into lumber before it deteriorates and becomes useless. Of prime concern is the opening of vast overripe decadent stands of virgin forests where losses from insects and disease exceed growth. Too little attempt has been made to convert these extensive stands to growing forests. This can only be done through an orderly harvest of the overmature stands to make room for a new crop of growing trees. As long as we have extensive areas of overripe, susceptible stands such as now occur principally on national forests, state forests, and Indian reservations, we can expect continuing heavy losses from insects and disease.

Fire, disease, bugs

With an abnormally damp summer season, 1954 saw few fires in comparison with previous years. The work of local "keep green" organizations and safety organizations also contributed to the low incidence fire season. Insect depredations continue to take heavy toll of virgin forest stands. New outbreaks and insect population increases throughout the region tend to offset any gains. In Ponderosa pine stands, however, losses have been materially reduced by removal during regular harvests of insect susceptible trees. At the present time, insects are doing considerable damage to Engelmann spruce in Idaho, Montana, and Colorado. The spruce budworm in Oregon and Washington and the Douglas fir beetle have been particularly active.

By use of selective cutting practices, the best design for pine regions, harvesting small logs does not present the problem that it does in other regions. The general practice is to leave smaller trees in the woods to produce the next saw timber crop, inhibit the invasion of brush, and provide a seed source.

Many lumber companies have calculated rates of growth in their own holdings and region-wide estimates have been made by the Forest Service, but in general the much-needed growth data on Western forests has yet to be determined accurately. Accurate growth data is particularly important in computing the allowable annual cut on any given piece of land.

Equipment

A good deal of new and improved equipment was installed in Western mills during 1954, and the industry became a little bit more maintenance-conscious in the choice of this equipment. Cutting guide lines have seen greater acceptance, as have grading lights and better grading tables. There is a growing trend toward more automatic production and the employment of fewer men in the mill. The trend in carriages is from 2-men carriages to 1-man carriages to riderless-carriages. Lumber handling equipment is also improving with automatic stacking and sorting, two of the principal man savers.

Band headsaws are gradually replacing circular saws, particularly double circular saws, and more resaws are being installed. Very few

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double cutting band saws are being installed, but all other saws are now equipped with sliver teeth.

More operators are installing their own dry kilns. Smaller units are becoming feasible, and oil and gas-fired kilns are beginning to come into the picture.

Some operators are using band head rigs with horizontal re-saws to mill lodge pole pine in Washington, Idaho, and Montana. More and more lodge pole and white fir are being cut because of their greater availability and lower stumpage costs.

Barkers

A few barkers have been installed, but costs which range from $125-$300,000 each are still prohibitive.

Low-cost barkers are, in effect, a key to further wood utilization. Logs and unused wood must be barked before being made into chips for use in pulp and hardboard. Greater use of barkers would increase chip production, which is currently a billion board feet per year. More chips means better waste utilization.

Hydraulic barkers are still the most efficient and most expensive type in use but new mechanical barkers are being developed. The only inexpensive barkers are pressure type machines used in plywood and veneer mills. These generally have only a 10-in. blade and are too small for a lumber mill. They usually cost between $6,000 and $7,000.

There is some interest in applying head-type drive materials handling equipment in lumber mills since its successful application in other industries.

Equipment and methods receiving more use in 1954 included: automatic moisture meters (Laucks Sentry), industrial television, smooth-end trimming, waxing, and printing, open car loading, dimensional control at the headsaw, better dry kiln controls, and cutting feeds and speed improvement.

A new means of grade marking using a non-penetrating ink appears to be more easily removed by sanding and is cheaper than present marking crayons and chalks. Several different colors are possible.

Automatic pre-set controls are finding application on headsaws, resaws, edgers and planers. These electronic devices allow an operator to set the cut while the saw is still cutting the first board.

Installation of chippers is definitely on the increase, particularly in paper and hardboard mills; 160 chippers are now in operation and more are being built. At the present time the maximum feasible haul for chips is 125 miles by rail and 50 to 75 miles by truck. At the present time, chips are blown into railroad cars or trucks without any further consolidation. This, however, results in a good deal of waste space and does not utilize the weight capacity of either the truck or car. Various attempts have been made to utilize the weight capacity by compressing the chips but no really efficient way of doing this has yet been found.

Research continues to be an important part of the budget in all the larger companies, universities, and associations. The development of forest by-products is eating up a good deal of the West's wood waste, and pilot plants for new processes are being found in lumber mills with increasing frequency. Crown Zellerbach and Weyerhaeuser are the leaders among private industry. Serious consideration is being given to using the several million acres of hard woods growing in the Northwest. A few mills are doing quite well cutting maple and alder.

Mill operators in 1954 went to greater lengths to protect their stock-piled raw material. Logs are being bundled in lots of 4,000 to 5,000 bd. ft. before being dumped into the log pond to keep from losing the sinkers. A further advantage is that no stain can develop on logs that are under water. The only problem is that log ponds have to be deeper than usual. Logs stored out of water, or cold decked, are being subjected to end coatings or sprays, and sprinkler systems are used to give the effect of 1½ inches of rain per day. This tends to prevent checking, still one of the industry's greatest problems.

SRI report

One of the most important forecasts for the lumber industry in some years was provided by Stanford Research Institute for Weyerhaeuser Timber Co. Summarized conclusions of this survey are as follows:

Annual lumber production will increase moderately through 1975 to a level of about 41 billion board feet for the nation as a whole. This compares with 38.2 billion board feet in 1952, a good year.

Lumber demand will increase substantially if price relationships to competing materials stay where they are. Only limited increases in domestic production and imports are expected without prohibitive increases in cost. Therefore, the price of lumber is expected to continue to rise more rapidly than the price of the competing materials. These competing materials will pressure lumber prices into the minimum possible increases, however.

Lumber use in construction is likely to be centered in new residential building, with the smaller share going into non-residential construction, and about the same proportion as now into maintenance and repair. Sheathing lumber accounted for about 80% of the sheathing market in 1920, 58% in 1953, and it is expected that by 1957 it will be only about 43%.

It is expected that lumber consumption in sawn railroad ties will decrease while the number of wood pallets will continue to increase.

Increased production of softwood lumber in the West and of hardwood lumber in the South is likely to be the only significant change in domestic production between 1952 and 1975.

Utilization does not stop in the woods but is carried through the finished product. In the mill, improved manufacturing techniques are providing an improved consumer product at constantly reduced production costs.

Construction of mills with steel frames has far outstripped the building of wooden mills, and large wooden mills are being slowly replaced with steel underpinnings. There is, however, a tendency in the industry to cling to wooden construction.

The newest mills are being put on concrete slabs which have the advantage of being impossible to burn up. Present insurance costs on wooden mills range from 50c to a $1.50 per thousand board feet of cut. Rates are considerably lower for less inflammable construction.

Promotion

Promotion efforts for 1954 were at an all-time high and 1955 will very probably set another new record. Western Pine Assoc. and West Coast Lumbermen's Assoc. are promoting the use of white fir, Engelmann spruce, and Western pines in consumer magazines, direct mail literature, movies, radio, and television. Personal contacts are being made with architects and contractors to furtther sell the use of wood.

Television has been the largest force during the past year for the Western Pine Assoc. One half-hour movie has been presented as a public service on 366 TV showings to more than 86,000,000 people.

Most of the promotion used follows an institutional approach. The idea has been to sell the uses of wood with relatively little mention of species and no mention of brand name. The assumption is that if the use of wood can be sold, everyone involved will benefit.

The California Redwood Assoc. is continuing to promote the use of this California specie and with increasing success. Requests for information put 1954 39% ahead of 1953—the region's best promotion year ever. Eastern shipments increased 23% over the previous year, while total shipments were up 13% and total production up 4%. Production of 10 months for 1954 was 519,740,000 fbm.

The lumber strike in the Pacific Northwest was not general in Northern California and helped out Douglas fir producers in that region with a flood of orders. A railroad strike which tied up the Northwestern Pacific for about a month hurt the industry somewhat by reducing shipments out of the region by 225 cars daily. With the optimistic prediction of greater construction for 1955, the outlook for the redwood region is very bright.

Western Red Cedar operators banded together last spring to form the Western Red Cedar Lumber Assoc. This group includes more than 90% of production and is an international group in that it crosses the border into Canada. The association is just starting projects of trade promotion and research.

Western Outlook

SHAKES AND SHINGLES

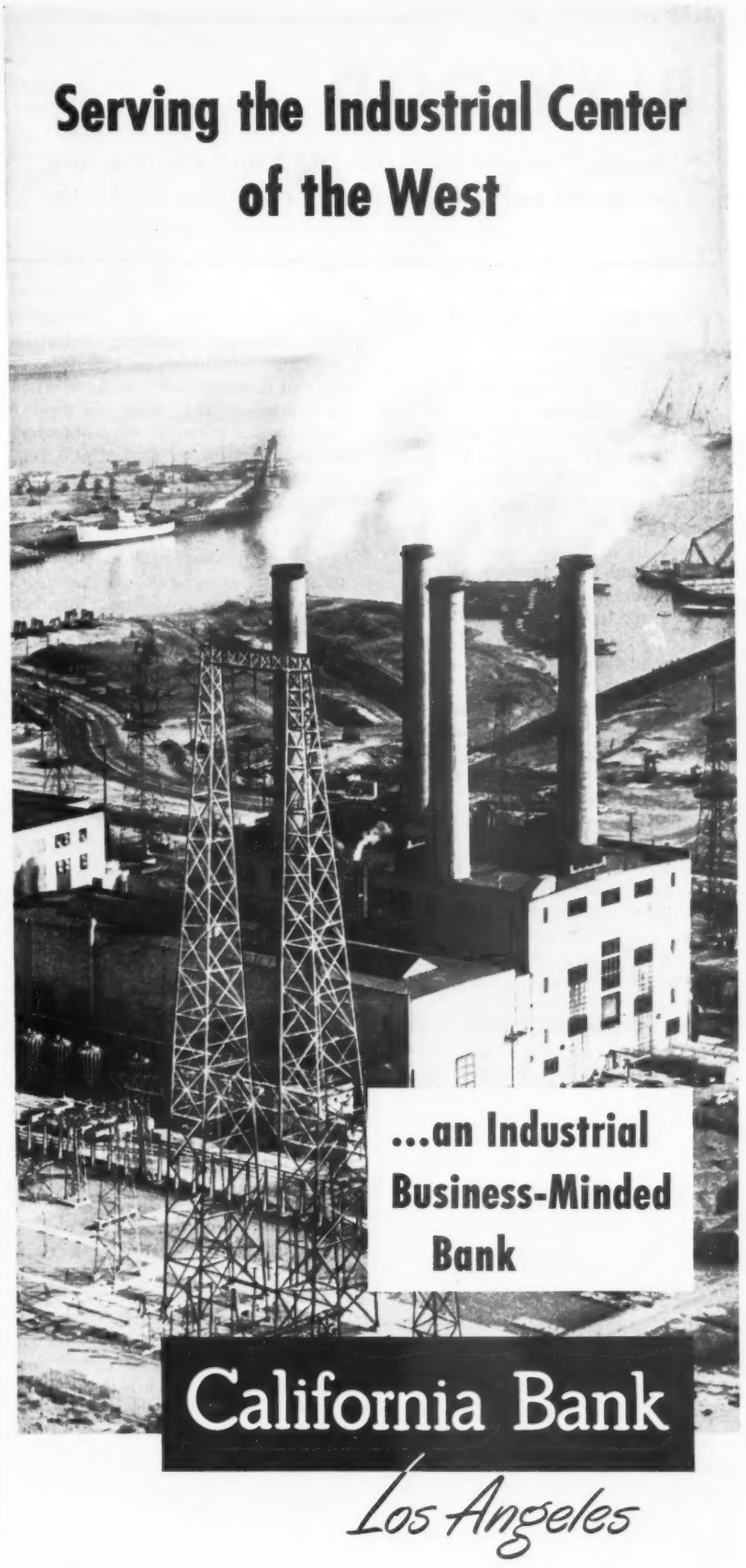
Business better than expected. National markets expand while prices climb by 40%.

DEMAND for red cedar shakes and shingles of all kinds for 1954 was better than anticipated. Business in the nation as a whole picked up noticeably over 1953.

Pacific Northwest manufacturers indicate that all mills are running at capacity with reasonably adequate backlog of logs for the winter. The near 90-day strike had rather little effect on the shingle business except on the "combination" mills which produce both shingles and lumber.

Consumer acceptance of processed shakes and shingled panels showed growing popularity during 1954.

During the past year the Red Cedar Shingle Assoc. has set up grading and inspection standards for machine grooved shakes, one of a number of processed shakes. Generally speaking, prices appear to be up around 40% over the previous year. No. 1's, selling in 1953 for around $7.50, now go for closer to $10, and No. 2's, selling in 1953 for around $4.50 now go for around $6.50.



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Western Outlook

PLYWOOD

Another record year for 1954 and construction prospects point to an even better one in 1955.

THE Western fir plywood industry set another production record in 1954 despite a long summer strike. As the year drew to a close, it was apparent that production would top last year's record high of 3.7 billion feet by another 100 million feet for a new record of 3.8 billion. Manufacturers can reasonably hope for sales of 4 billion feet in 1955.

Capacity to produce is similarly expanded, and the number of plants manufacturing basic grades of fir plywood in the three West Coast states is now 97, an increase of about 10 plants during the year.

One of the most significant announcements of the year was contained in the Stanford Research Institute survey, prepared for Weyerhaeuser Timber Co. Summarized plywood results are as follows:

Supply and utilization prospects indicate the price of softwood plywood and veneer will very likely rise in relation to the price of competing materials, but not as rapidly as hardboard products. The rise in price will probably be less than that for lumber.

In softwood plywood, the substitution of other materials for face veneer will probably widen the acceptable log quality range. Further improvements in patching and expanded uses of species other than Douglas fir are expected to broaden the supply base.

In hardwood plywood and hardwood face veneer, present costs are at a level that allows selling imports of comparable quality for less than those produced domestically. Considerable markets have been lost to imports during the last two years. No great changes in price are expected for utility grades of hardwood plywood compared with competing materials, but hardwood plywood is expected to meet more competition from the softwood plywood and hardboard industries.

Both softwood and hardwood containers are expected to maintain present price relationships with competing materials largely as a result of using low grade veneers and shipping containers.

Demand for veneer and plywood comes chiefly from the construction and shipping container industries, with the remainder going into a variety of manufactured products. About two-thirds of the veneer is used to manufacture plywood, of which about 50% is used in residential and non-residential construction.

New equipment

The Raimamn patching machine gained in popularity during 1954. Douglas Fir Plywood Assoc. members now have 91 machines in 54 mills. This represents around a 100% increase during the last year. About half a dozen mills have been experimenting with tapered shim patches cut for split veneers.

The industry's interest in merchandizing of specialty items is growing stronger. More hardwood plywood is coming into the picture, and there are now 12 mills producing brushed plywood. This trend toward brushed plywood has stimulated construction of equipment designed for producing various specialty items.

Distribution plan

Rapid growth of the plywood industry has brought about some very large problems in distribution and these have been further magnified by consistent overproduction. The history of the industry shows a constantly repeating cycle: productive capacity outstrips supply, inventories rise, and prices drop. The industry can hardly afford to weather many more chaotic cycles similar to those of 1951, 1952, and 1953.

One Western manufacturer has come forward with an industry-wide merchandizing plan as a partial answer to the problems of distributors and manufacturers. While the plan has not yet been put into effect, it was explained at a regional meeting of the National Plywood Distributors Assoc. and met with an almost completely favorable response.

This plan would:

1. Help to minimize speculative buying and gear distributors' purchases to the actual consumption of plywood at the end use level.

2. Permit the distributor to maintain regular minimum purchases each month.

3. Standardize policy on future orders.

4. Allow the distributor to buy from more than one manufacturer; and the manufacturer to sell to competing distributors.

5. Provide capacity leeway for demand in strong seasons.

6. Hasten the day when demand and supply could return to a better balance through the use of advertising and promotion.

These are just a few of the plan's objectives while trying to bring the industry stability and to increase the per capita consumption of plywood.

Despite the forecast that plywood demand may double in the next 20 years, industry leaders are focusing

Construction picture bright

Right now, most factors point to a good year ahead. About 80% of fir plywood goes to the broad construction field or for construction components. The building industry is in solid agreement on estimates of 1,200,000 new housing starts in 1955.

At the same time, more and more plywood is going into every new home built in the country. In 1950, for example, the manufacturers sold 2.6 billion feet of plywood with new housing totaling 1,360,000 new starts. In 1954, despite 260,000 less starts, total sales topped 3.8 billion feet, evidencing the amazing penetration of plywood use in the light construction field.

But new housing, which accounts for only 42% of the total construction market, is only part of the story. Remodeling, maintenance, and repair, a mammoth plywood outlet where the panels are used for everything from temporary screens to siding and roof decking, takes 36%.

A $900,000,000 market in warehouses and offices is expected, and structural grades of fir plywood used for decking large roof surfaces will find another volume outlet here.

their attention on the more immediate objective of boosting sales to keep pace with the continuing growth of productive capacity.

Review of 1954

In the first quarter, manufacturers seemed to be making an excellent start with new orders topping production, which ran at about 75,000,000 ft. weekly. But orders turned sluggish and to further aggravate a steadily softening market, the expected surge in spring building did not materialize, due primarily to bad weather in the East and Midwest.

The industry suffered a market break in the spring that tumbled the backlog to a low of 252,000,000 ft. The recovery was slow and buyers remained cautious in the face of a strike threat which finally materialized into a six-week summer work stoppage affecting about 50% of production.

Production, which had been holding at about 90% of capacity prior to the strike, fell to 40,000,000 ft. during the first week and hovered around that figure until the settlement.

As the industry picked up again in September, it was apparent that the picture had changed entirely. During the strike, building made a spectacular spurt. The channels of distribution emptied and jobber stocks fell off sharply.

These factors all contributed to a pent-up demand for fir plywood that the manufacturers could not even dent during the last three months of 1954. Week after week they set new production records and accepted record high weekly new orders in their attack on the steadily climbing backlog.

At this writing, the order file for the industry stands at 550,000,000 ft., the highest on record, and weekly production was running at 90 to 96,000,000 ft. weekly, an annual rate of 4.5 billion feet.

There is another side to the coin, of course. Over-production and market instability is a constant threat. Substitutes for fir plywood are reaching for broader markets in the construction field. New building products are creating more competition. A whole new generation of businessmen are buying plywood and they aren't taking it for granted. Structural engineers are demanding complex engineering and product analyses unheard of five years ago. Code officials, although accepting plywood, must have basic technical data to support their official requirements.

To work out the educational problems involved is too great a challenge for any one manufacturer. The manufacturers are doing it through their joint industry trade association with the heaviest promotion program in their history.

During the past year, the Douglas Fir Plywood Assoc. doubled its field force, and 25 field promotion representatives made 24,000 personal calls on building code officials, structural engineers, architects, builders, industrial specifiers, and trade sellers. A mass media advertising schedule racked up 450,000,000 impressions in 89 magazines.

Special yard signs permanently identifying the user as THE source of supply for plywood are available. Sales helps run the gamut from temporary store displays to ad mats and TV commercials.

In 1955, the industry will celebrate its Golden Jubilee—50 years of better building with fir plywood—with an even bigger promotion splash. It will produce 50 fresh new building ideas and storage unit projects for builders and do-it-yourselfers and display them in a miniature World's Plywood Fair.

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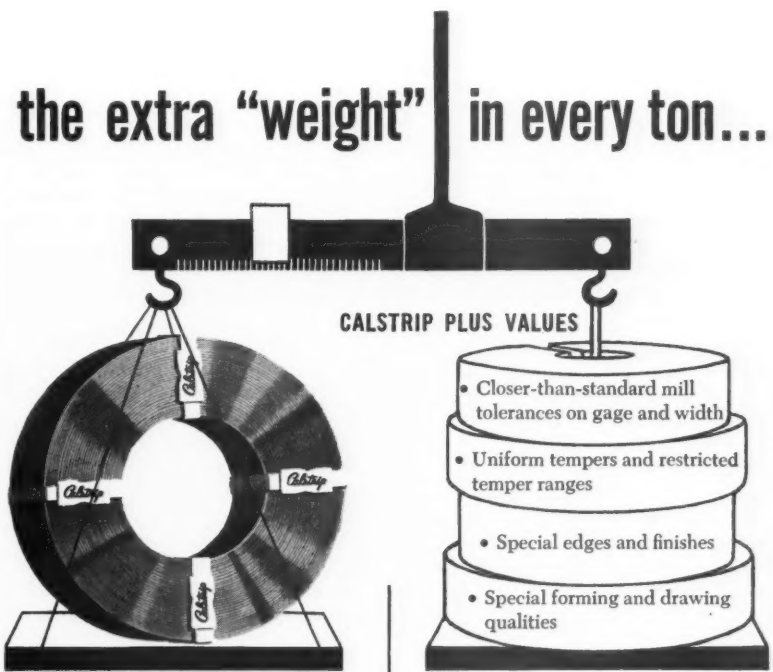
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Western Outlook

PULP AND PAPER

Western papermaking celebrates its 100th anniversary with a record year; and still growing.

PULP and paper production in the Pacific Northwest, as measured by pulpwood consumption, was expected to chalk up another record year for 1954. During the first six months pulpwood consumption topped the comparable period in 1953 by more than 13%. The industry consumed 44% more raw material than in a like period of 1950.

This rapid expansion in output has brought periodic market problems, but the steady growth and use of pulp derivatives—including rayon, explosives, and film, as well as all grades of paper and paper board—promises that oversupply problems are not likely to become critical.

Paper making in the West celebrated its 100th anniversary in 1954. The West's first mill was a 36-in. paper machine hauled overland to Salt Lake City by Brigham Young in 1854 to make paper out of odd rags and wagon covers. Now, 100 years later, Crown Zellerbach has installed what is acclaimed the world's most modern crepe tissue machine with a 258-in. blade at the St. Helens Pulp and Paper Co., St. Helens, Ore. The Salt Lake City mill is still operating.

The West's pulp and paper industry is undergoing a period of tremendous growth, exceeding even the West's rapid growth in population. A considerable amount of money is being invested in plant and research, and the outlook for the future is very bright.

One of the most important forecasts to come out in several years was the Stanford Research Institute's survey for Weyerhaeuser Timber Co. Summarized results on pulpwood follow:

Supply factors indicate that the upward trend in production can be sustained for the next 20 years, with costs maintaining their relation to competing materials about as they are now.

Expansion in the pulp industry has always come through the development of additional sources of low cost pulping materials through modification of processes. Significant expansion of output during the next 20 years is expected in all but two major pulp grades.

The following developments will have a favorable effect on the fuller utilization of mill residuals as well as low grade or unusable timber in the woods: (1) pulp processes economically using small size timber and wood leftovers; (2) barkers and chippers that are more efficient and cheaper; (3) semi-chemical pulping to be used on hard woods; (4) sulphate pulping using nearly all species of softwoods and hard woods; (5) and groundwood pulping to include a wider range of species.

The potential supply of chippable materials in the West, with a lumber production of 20,000,000 fbm. annually and with about the same size distribution of mills as now, is estimated at about 8,800,000 cords.

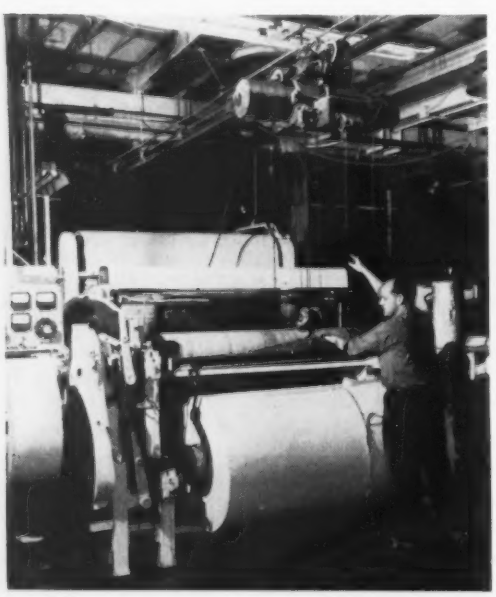
This potential is based on the assumption that either whole log or slab barkers will be used for handling all material. Nearly a third of this material is produced in mills cutting less than 10,000,000 fbm. annually.

The pulp and paper industry last year was characterized by (1) improved land use and forestry practices; (2) greater utilization of wood wastes (both in their own and other forest products industries); (3) great expansion and investment in production facilities; (4) increasing emphasis on in-the-plant efficiency. (5) greater emphasis on research.

W. David Hagenstein, managing director of the Industrial Forestry Assoc., Portland, indicates that in less than 20 years wood pulp and hard and soft wood industries will be getting 75% of their raw materials from wood leftovers which others cannot use or sell. In 1929 an average of 21,000 bd. ft. of potentially usable material per acre was left in Washington and Oregon woods following logging. By 1943 this had been cut to about 10,000 bd. ft., and in 1953, less than 5,000 bd. ft.

This huge elimination of waste was due not only to the use of sawmill and plywood leftovers, but also comes from relogging of previously logged or burned land, with the resulting utilization of much insect-killed and wind-thrown timber. Kraft pulp mills are now being planned to subsist entirely on forest and mill leftovers—former waste. Kraft pulp is used to make lower grade papers like brown wrapping paper, envelopes, container board, etc. Almost any wood species can be successfully treated by the Kraft process.

Per capita consumption of paper for the United States is now around 400 lb. The formula for one ton of finished kraft pulp calls for: 2.6 air dried tons of wood chips, 130 lb. of salt cake, 55 lb. of lime, 95 lb. of burnt lime, 20 gal. of fuel oil, 220 lb. of chlorine, 75 lb. of caustic soda, 18,000,000 Btu's of steam, 535,000 kwh.



ROLLS OF PAPER are handled from waxing machine to storage racks at Western Waxed Paper Co., Portland, Ore., by a Cleveland track and transfer crane system.

of electricity, and 65,000 gal. of filtered water.

Washington continues to be the leading producer of pulp and paper products. More than 30 Northwestern mills supply raw material for everything from envelopes to seat covers.

Cellophane

It is estimated the West Coast consumption of cellophane in 1952 was about 30,000 tons per year, and assuming that all this production came from the nearest plant — in Iowa — freight costs being paid annually by West Coast users total more than $17,000,000. In other words, a firm located in Portland, Ore., buying 100 tons of cellophane each year in carloads lots, supplied by a cellophane plant located in Seattle, would potentially save $5,340 per year in transportation costs alone.

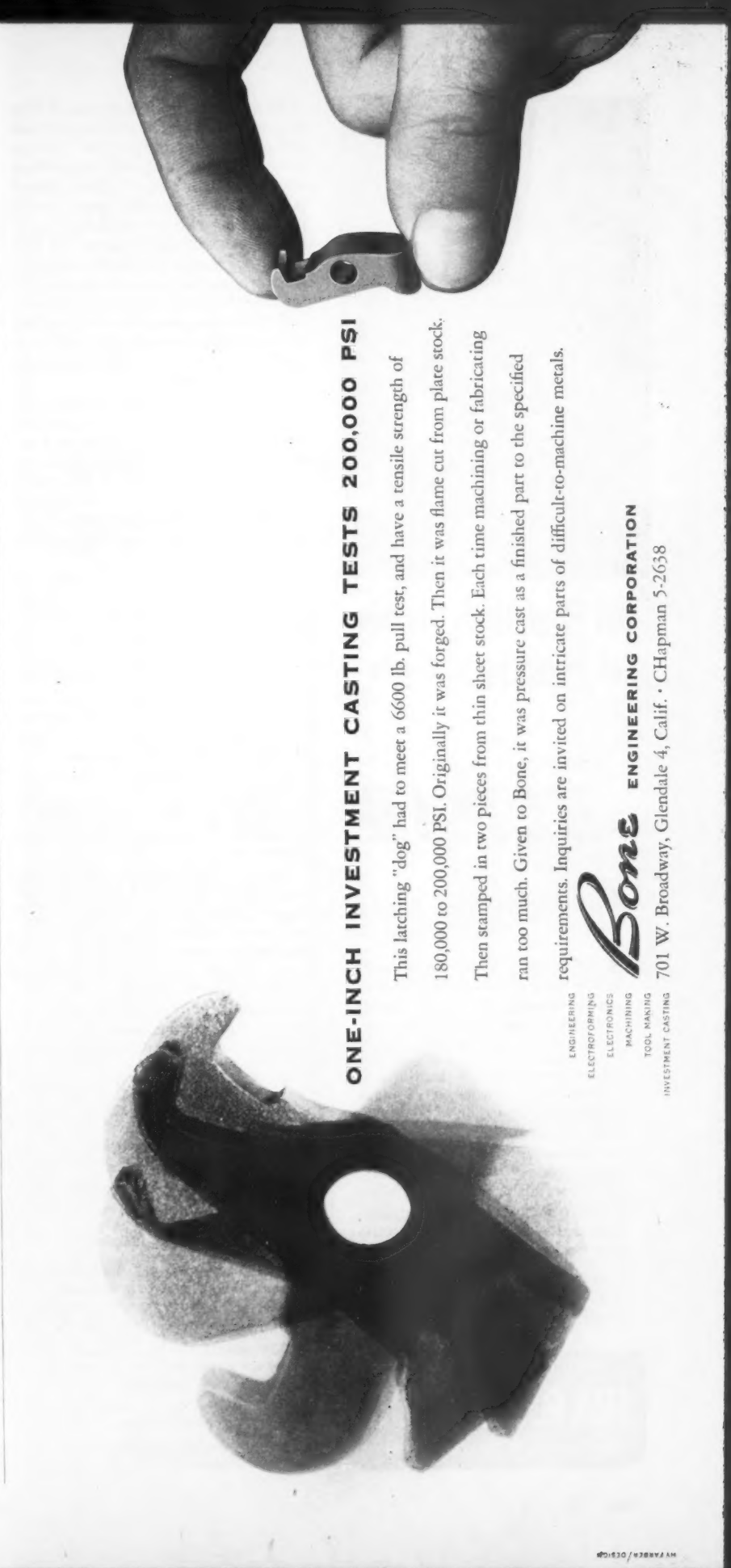
The Western market differs widely from national consumption percentages for three reasons:

1. There is little or no tobacco processing requiring packaging.
2. Manufacture of converted paper products is not as active nor as extensive as in the East.
3. Frozen and consumer package food industry is far more extensive in the West than in other parts of the nation.

The amount of cellophane consumed in packaging the frozen and dried foods in the West may be conservatively estimated as 46% of the cellophane consumed for similar usage nationally. Estimates of the regional market for cellophane for use in food packaging ranged from 20,000 tons a year to more than 36,000 tons per year.

Three factors hint at the practicality of establishing a cellophane manufacturing plant in the Pacific Northwest. They are: (1) the availability of high grade wood cellulose — the basic ingredient for cellophane; (2) the large and growing Western market for cellophane in the frozen and consumer package food industries; and (3) nonexistence of cellophane production in the United States west of Iowa.

Ecusta Paper Corp., Pisgah, N. C. subsidiary of Olin Industries of New Haven, Conn., last spring filed options on two 200-acre tracts near Red Bluff, Calif., as possible sites for a proposed $20,000,000 cellophane manufacturing plant. Considerable opposition was raised by those fearing pollution of the Sacramento River, but the Central Valley Regional Water Pollution Board revised its regulations to allow limited waste discharge into the river. This revision clears the way for further planning of a plant expected to employ 250-500 persons.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As indicated in other reviews (Lumber and Hardboard), maximum wood utilization depends upon the conversion of present-day wastes into chips which can be used by hardboard and pulp and paper manufacturers. At the present time, chippers are being established all over the industry, but hydraulic or mechanical barker installations are so expensive as to be feasible for only the larger operators. Barkers, sufficiently inexpensive to be installed in small mills where the greatest waste takes place, would provide more and less expensive chips.

The dwindling supply of easily accessible virgin timber continues to direct procurement of pulp wood toward the use of chips from lumber and veneer mills. The effect of this trend is to lessen the drain on forests and broaden the wood supply base of the industry, insuring adequate supplies of raw material for the future.

Stream bank shipping (banding of logs together to prevent the loss of any sinkers), whole log chipping, hydraulic barking, salvage logging, the use of some plywood waste, and a certain amount of forest thinning are all contributing to better land use, and consequent higher degree of log utilization. Forestry practices and tree farm standards have been generally accepted, particularly by the large and medium sized operators, and roughly half of the privately owned forests of the Pacific Northwest are now in tree farms.

Among developments during the past year or two have been a rapid extension of coating box boards and offset papers, chlorine dioxide bleaching and more stages of bleaching, more push button operations throughout mills, the use of alder for pulp, more high yield pulping, improvements in food packaging, and speed-up of paper machines with vacuum transfers and other changes.

The Pacific Northwest and the Inland Empire comprise the leading pulpwood producing region for its size on the entire continent. It has been established that over 10% of the entire American economy is based upon pulpwood and its products.

Western expansion

During the past year Weyerhaeuser Timber Co. built a pulp research laboratory at Everett, Wash., to replace a smaller laboratory at Longview, Wash. Mill facilities at the Longview pulp mill were expanded and a new paperboard machine installed.

Scott Paper Co.'s expansion program at Everett, Wash., continued with building on the paper mill and addition of facilities in the pulp mill. The latter is already the largest bleached sulphite mill in the world. In December 1953, the first high-speed paper machine in the company's mill went on the line, followed by a second machine a few months later. In 1955 two more high speed paper machines and related equipment will be installed in another new section of the paper mill, construction of which is now under way.

The pulp mill has been enlarged and one unit has been converted from calcium to ammonia base cooking, providing for the use of additional species in the manufacture of bleached sulfite pulp. Other new equipment installed in the mill to permit increased production includes a new Bellingham barker, an additional sulfur burner, a Jensen cooler and acid accumulator, additional flat screens and washersand deckers. Production now averages over 700 tons daily.

During 1954 Crown Zellerbach worked at the modernization and expansion of the previously installed pulp and paper making facilities at the mill at St. Helens Pulp and Paper Co., St. Helens, Ore. One of the largest and most modern paper machines is being installed to produce tissue. Two new mills are now under way and should be complete some time in 1956. One is a kraft paper mill at Antioch, Calif., the other is a kraft pulp mill at Duncan Bay, British Columbia.

C-Z researchers have developed a new product from concentrated spent sulfite liquor at the Lebanon, Ore., plant. It consists of a mixture of ammonium lignin sulfonates and sugars. This dry powder is said to have potential uses as brickette and ore binder, in adhesives, as an emulsifying agent, in soil additives, as a chemical extender, tanning agent, etc.

Ketchikan Pulp and Paper Co. mill, the second cyclic magnesium base sulfite recovery operation to be built in Alaska, opened in 1954.

Pacific Coast states pulp production

Year	Tons
1950	2,417,998
1951	2,768,848
1952	2,766,277
1953	2,940,147

Pulpwood production in Western Oregon and Western Washington

1953

(in millions of cubic feet)

Species	Western Oregon	Western Wash.	Total
Western hemlock	4,834	15,071	19,905
Sitka spruce	480	973	1,453
Balsam fir	3,940	6,347	10,287
Mountain hemlock & Englemann spruce	610	345	955
Black cottonwood	32	133	165
Total	9,896	22,869	32,765

Western Outlook

PAPER BOXES

Western manufacturers expanding rapidly as merchandising becomes competitive.

THE increasing competition in consumer products resulting in the need for these to merchandise themselves on their appearance is stirring up a great deal of activity among box manufacturers.

Most Western operators have been expanding and numerous large Eastern firms are shopping around for location in the West.

Manufacturers are streamlining their plants, palletizing materials wherever possible to reduce storage, using power-driven trucks to replace hand trucks, and conveyorizing handling operations. An example of the industry's increasing efficiency is the new Fleishhacker Paper Box Co. plant in San Leandro. It is a single-floor box manufacturing plant utilizing the latest in automatic equipment.

The last few years have seen the adoption by industry of rotary presses and lithographing of cartons. Both innovations are in line with the industry's trend toward greater efficiency and versatility. As the range of containers widens, equipment is becoming more flexible, both to meet customer demands and in an effort to reduce labor costs.

The industry has gradually made a changeover from animal glues to synthetic glues (caesins and vegetable glues). Synthetic glues offer a better and a whiter printing surface. Animal glues tended to crystallize or discolor and often took a long time to dry. New synthetic glues, now on the market, stick better, dry faster, and require less volume per surface area.

Folding boxes

Western paper boxmakers are again doing somewhat better on sales than other parts of the country, reports M. C. Badger, Pacific Coast representative of the Folding Paper Box Assoc. of America.

The folding carton industry is keeping pace with the dynamic Western packaging industry as a whole. Packaging in the West, estimated at $548,000,000 per year,* is the result of the westward movement of industry and markets.

The West, often referred to as the "mystery market" because of the radical merchandising developments of the past ten years, is actually the proving ground for new ideas. The consumer demand here for the ultimate in convenience in shopping presages the national trend. As more and more emphasis is placed on self-service, nocturnal selling, one-stop retailing, and planned shopping centers, it is inevitable that greater emphasis will also be placed on packaging.

In a system where your own product must also be its own star salesman, then it must be packaged. And, of course, with an increase in packaging, there will also be an increase in the production of folding cartons.

Self-service—automatic, visual retailing—depends on pre-sold brands. This means pre-selling brand identity through advertising.

As part of the retail revolution, we are witnessing the gradual emergence of new techniques in carton packaging. The development of new paperboards facilitates good, clear printing, and new laminations with foil and polyethylene prophesy new uses for folding cartons.

* Source—McGraw-Hill.

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By L. J. ROWLEY
Manager, Traffic and Transportation
Lockheed Aircraft Corp.,
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Savings in the cost of fuel are most impressive, but even greater savings were realized by the fact that oil need be changed no more often than every 1,000 hours on vehicles equipped to use propane, instead of every 50 to 100 hours on gasoline powered equipment. Furthermore, it now appears that equipment need not be overhauled more often than every 8,000 to 12,000 hours as contrasted to the present interval of 1,000 hours use.

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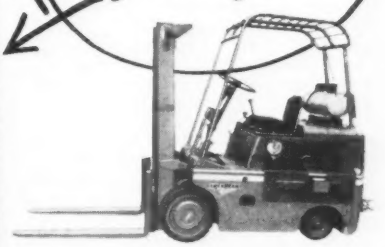

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Western Outlook

HARDBOARD

Four new mills begin production as the West's youngest forest products industry grows larger.

HARDBOARD, the West's youngest wood waste consuming industry, continued to grow during 1954. During the past year four new hardboard mills went into production, adding more than 20,000,000 sq. ft. to the West's monthly production capacity.

Despite the possibility of reduced prices, a rather bright future for hardboard is expected both for the forthcoming year and, according to Stanford Research Institute's survey for Weyerhaeuser Timber Co., for the more distant future. Summarized results of the survey indicate that the prices of insulating board and hardboard will drop in relation to the prices of competing materials between 1952 and 1975.

It is possible that the heavy swing toward building board production will provide new production capacity faster than expected market growth. The industry's capacity has increased rapidly during the past several years.

With capacity greater than market demand, a price drop might be expected. If this occurs, building board prices will be very favorable in relation to those competing materials.

Hardboard is being used more and more by the construction industry because of its relatively low cost and adaptability to many uses. Total hardboard consumption for all uses is expected to increase from present levels of about 1.2 billion square feet to about 3 billion square feet by 1975.

The increase in production in 1954 points up a general improvement in wood utilization, since the raw material supply for hardboard is based largely on residue wood not suitable for solid wood products. Future growth of the industry is likewise based on even greater utilization of forest waste.

The essential properties of the hardboard which accounts for its increasing acceptance as a construction material are its large sizes, surface hardness and smoothness, high strength and uniformity in regard to properties, color, thickness, and density. From a manufacturing standpoint, hardboard is a product whose properties are subject to control and can therefore be changed to meet fluctuating consumer requirements.

Weyerhaeuser Timber Co.'s new Klamath Falls, Ore., mill began production in 1953, and came into full production during 1954 with a capacity of 7,500,000 sq. ft. per month.

A departure from conventional fiberboard will be a moldable board which is expected to find wide use in auto body parts, laminates, and facings over various core materials.

Oregon Fiber Products, Inc., at Pilot Rock, Ore., brought a softboard-hardboard combination plant into operation early last year. Monthly production, all of which goes to U. S. Gypsum Co., is 7,800,000 sq. ft. per month.

Willamette Fiberboard Inc. at Sweet Home, Ore., was scheduled to come into production in late 1954 with a reported capacity of 2,900,000 sq. ft. per month. A dry fiber process will be used to manufacture hardboard from saw mill residue in the area.

Washington Hardboard Co. of South Bend, Wash., has converted its chipping plant to full scale production of hardboard. Initial plant capacity was approximately 2,000,000 sq. ft. per month and will ultimately be expanded to 8,000,000 ft. per month. The plant uses a dry fiber process with air felting. Raw materials will be saw mill residue in the area.

Montana Hardboard Co., of Missoula, Mont., completed construction of a chipping unit in December 1953, and has been shipping chips to a pulp mill while installing equipment for its hardboard plant. The Plywood Research Foundation's semi-dry process will be used to manufacture approximately 3,500,000 sq. ft. per month at full capacity. Plans for expanding to double this capacity are included in design of the plant. Initial hardboard production is scheduled for late 1955 or early 1956. With the large addition to hardboard producing capacity, a buyer's market may very well be produced during 1955 and 1956.

A number of particle board operations are scheduled to begin production in early 1955. This type of board has not been commercially produced in the West, except for Novaply and

the flake board pilot plants at Long-Bell in Longview, Wash., and the Pack River Lumber Co. at Sand Point, Idaho.

As the Western forest products production center moves further south each year, speculation as to the eventuality of pulp production in California is being given more serious thought. Difficult problems, however, have yet to be solved before a pulp industry can come to California. In the wet process, the key is finding sufficient water or other means of discharging the effluent. Dry process hardboard has not been tried in California because of the prohibitive cost of resins. Sooner or later, however, research will develop a process that is suitable. Meanwhile, California's potential as a producing area will continue to grow.

A great deal of research is being done by current producers and interested parties to build better board and develop better markets. Research can be divided into two categories: (1) development of a market for an already existing board, and (2) development of a board for an already existing market. Considerable development of new processes and types of board has taken place during the past year.

Western Outlook

FIR DOORS

Lumber strike hurt but industry chalked up a few new gains over flush doors.

MAKERS of panel fir doors are still battling to regain part of the market taken over by flush door manufacturers; scattered gains were recorded during 1954, which saw the largest advertising and promotion budget in the industry's history and 1955 promises to be even larger. The gist of this promotion is to help sell fir doors and to help the trend from flush doors back to panel doors.

Production facilities in the industry remained about the same, and orders for 1954 ran a few doors behind the previous year. Orders through September for 1953 were 3,655,000 doors. For the same period of 1954 there were 3,610,000 doors. Production facilities, unlike the plywood industry, fluctuate along with door orders, keeping inventory and backlog small. This is partly because panel doors are something of a custom item.

The nearly 90-day lumber strike did inestimable damage to the fir door industry by slicing away hard-earned markets which subsequently returned to flush doors when the Northwest industry was unable to meet market orders. Generally speaking, however, the year saw notable pick-up in panel door orders from flush door strongholds. These included New York, Texas, Cleveland, and Kansas City.

Panel door makers were mildly optimistic about the future as a backlog of orders poured in after the strike. Sixty-five per cent of the Northwest's panel doors go to the centers of colonial architecture in the south, while another 20% go to their counterpart in New England.

The great volume of flush doors hitting the market since the war came partly as a result of the building boom in 1950 which demanded 18,000,000 fir doors. The Northwest, working three shifts, seven days a week, was only able to provide 10,000,000 doors, and the flush door industry was born. Flush doors can be made on a production basis for an investment as small as $2,000, while nearly $1,000,000 worth of capital is required to go into the panel door business.

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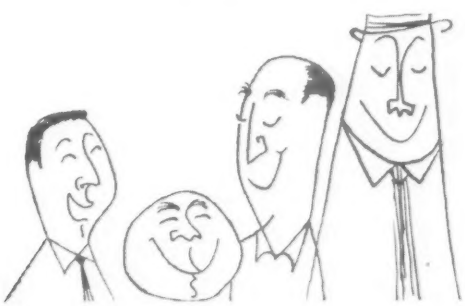

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Western Outlook

COOLING TOWERS

Outlook favorable for 1955. Trend in equipment is use of pressure treated lumber.

IN the face of a reduction in construction of industrial process facilities requiring cooling towers during 1954, the increase in air conditioning and refrigeration applications of towers and air-cooled exchangers held total volume up to approximately the 1953 level. Recent bookings, requiring delivery in 1955, make the prediction for next year definitely favorable.

Physical improvements and additions of new, high speed woodworking equipment in several cooling tower fabricating plants increased the industry investment in plant facilities approximately $1,200,000 in the California area during 1954. Plants are located at Arcata, Santa Rosa, Stockton, Merced, and Los Angeles.

Two specific equipment trends turned slightly during the past year. More widespread use of pressure-treated lumber in large towers became apparent. Although the induced draft designs continued to predominate the mechanical draft field, the use of forced draft designs in situations requiring high discharge stacks for dissipation of effluent vapor into the surrounding atmosphere showed a slight gain.

During the year the "smog control" committee in the Los Angeles area made inspections of cooling tower installations in refineries and reported observations that the pure water vapor leaving the towers was not a contributing factor to the eye-irritating smog condition prevailing at the time of the study.

Although California redwood dominates the industrial tower field as the major material of construction, use of masonry, asbestos-cement board, concrete, and steel continues to expand.

New material additions during the year past include the development of satisfactory all-redwood laminated plywood for use as sheathing and wall surfaces and the development of polyester vinyl bonded glass fiber "plastic" material suitable for non-structural parts of large industrial towers and for complete construction of the small commercial towers. Although no standard designs using the plastic materials are yet in production, it appears probable that limited applications will find a market in 1955.

Enforcement of local water conservation regulations in many municipalities, coupled with declining water table conditions— particularly in the agricultural areas of the Western states —will have more pronounced effect on the cooling tower industry than any other economic factors during the next several years.

Water conservation programs at national, state, and local levels will be prompted by a National Water Policy being drafted by the Eisenhower cabinet committee on water resource development. As the major item in any industrial water conservation program, water cooling equipment of all types, with cooling towers as the big volume component, will see a substantial increase in demand.

Expanded research programs directed toward improvements in design and operating techniques are being sponsored by the Cooling Tower Institute, headquartered in Palo Alto, Calif.

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Western Outlook

FURNITURE

New materials, cost cutting, promotion, and advertising help, but labor costs hurt.

A CREDIT pinch was the Southern California furniture industry's initial headache as 1954 dawned. Banks had tightened up on credit as a result of many weak spots. The bottleneck was solved, at higher cost, by widespread use of factoring firms, whose financing helped many manufacturers carry through until volume picked up again.

By year's end, the outlook had brightened. Business mortalities were dropping and the birth rate was climbing, with many small shops starting up to manufacture juvenile furniture. Retailers had been trimming inventories since 1953, and by July they had to buy. Optimism blossomed as the public, perhaps recovering from an overload of TV, auto, and home payments, came back into the market. For the first time in more than a year, manufacturers started 1955 with backlogs worth mentioning. Flourishing discount houses, however, were creating new problems for the industry.

In Southern California, competent skilled workers and machine operators were hard to get but helpers were plentiful. Wage costs were up, chiefly through fringe benefits. There were some strikes in chrome and upholstery plants. Productivity and material costs were about the same. Some firms benefited, others were pinched, when rates on unpacked (blanket-wrapped) freight were changed from a per-item to a per-hundredweight basis.

The trend toward conveyorization progressed, particularly in metal furniture operations such as dipping and slow coating.

Western Outlook

PRODUCE CONTAINERS

Container revolution goes on. Prepackaging expands. Trend toward small sizes.

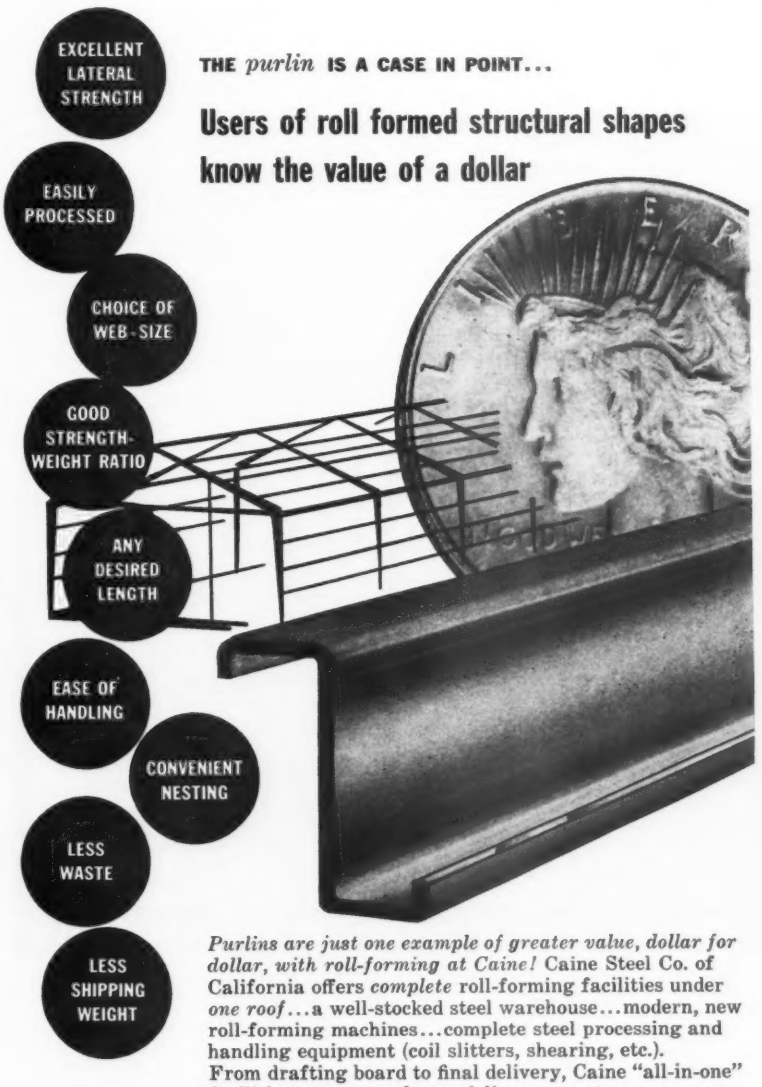
THE container revolution which started in the produce industry several years ago continues, but with less violence.

The trend toward smaller units for shipment of various vegetables now continues but in orderly fashion. Nothing like the 18 to 20 sizes which hit the lettuce industry has again occurred.

During the past year or two there have been a number of new smaller containers adopted. Artichokes have gone into a half-size nailed box, and broccoli is in the process of going into a half-size nailed box carrying 14 bunches, replacing the 28-bunch pack.

Vacuum cooling, which made possible the use of the half carton for lettuce, is now leading to experimental shipments of celery in half cartons. Celo pack carrots in two dozen lots have had some success, but the four dozen wirebound crate is still representative of the major volume.

Wirebound containers are being used in the half lettuce field to some extent, and a new cauliflower crate in this construction, known as the Long Island crate, has made its appearance and is being used in considerable volume.



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Western Outlook:

FISH

Good Northwest salmon run. Frozen fish slowly gaining on fresh fish consumption.

FISH canning in the Pacific Northwest in 1954 saw a good run and pack of salmon, and improving markets. Consumer acceptance of fish on the table is growing as a result of intensive promotion and advertising.

The Puget Sound salmon pack, in cases of 48 lb., is as follows:

Species	1953	1954
Sockeye	182,540	479,061
Chinook	2,842	1,936
Silver	30,946	12,078
Pink	411,248	...
Chum	1,550	1,979

There were about the same number of freezer ships operating between the Northwest and Alaska during 1954 but their operation is generally conceded as unprofitable. Freezing facilities on these ships are such that the fresh fish are frozen at just below zero and in brine. Due to the relatively high temperature, freezing is slow and the meat tends to oxidize and spoil.

Furthermore, a great deal of damage resulting in loss occurs when the fish are pried out of the freezer ship on arrival at the cannery site. Fish frozen in this manner yield less recovery for the canner and ultimate consumer after thawing. This type of freezing also tends to dehydrate the fish so that the meat loses both oil and texture.

Freezing for the consumer, on the other hand, is done at 40 to 50 deg. below zero and there is neither loss in quality nor volume and the quick freeze job keeps the meat essentially fresh. Oxidation may take place when the meat is not frozen. Consequently, frozen fish is often a good deal fresher than fresh fish.

The cost of packing materials has continued to climb since the war, and rising labor costs are a major factor in the economy of Northwest canneries. But the largest cost factor, the one that really hurts, is the cost of raw fish, even tuna. A number of packers have managed to reduce canning labor costs during the past year by consolidating their operations in groups at various Alaska canneries. This has meant the shutdown of some Alaskan canneries and reduced employment.

The problem of the No. 1 can is still around and still insoluble, apparently. This can is too deep to hold just one pound of fish and still comply with the legal maximum 10% head space. Changeover to smaller cans or larger cans would be at an estimated cost of around $20,000 per canning line. In addition to this, the smaller can has the disadvantage of producing a product at a greater unit cost, while the larger can would bring a higher shelf cost.

Both the tinless tin can and the thinner tin can are still in the research stages at American Can Co. Finishing the inside of the can with enamel turns out to be a tricky job and it has been found that no single enamel is good for all types of seafood.

Generally speaking, the amount of fish frozen at Puget Sound Canneries depends upon the size of the catch. Quick frozen fish, while costing more, is rapidly gaining consumer acceptance, thanks in great part to larger promotion and advertising budgets every year. Despite the tremendous promotion and resulting consumption of fish sticks, this novelty item seems to have cut into the sale of fillets and other cuts of fish. Frozen fish sticks are still something of an experiment since neither their rancidity nor their shelf life is, as yet, known.

Best informed sources indicate that eventually there will be a transition from bulk fish to frozen fish. At the present time bulk fish may be selling for 39c a pound while frozen fish brings 69c a pound, and this margin appears to be the thing that's holding down widespread expansion of the frozen fish market. Still, the trend is toward frozen fish and the trends of frozen meats and butcherless butcher shops are helping to pave the way. There is still a good deal to be learned about freezing fish but research will probably supply the answers to present-day problems before too long. Coho and chum lend themselves well to freezing, while pink salmon is not satisfactory. Widely differing results in freezing indicate greater potential markets for those fish which particularly lend themselves to this type of sales and storage.

Seemingly the optimum operating conditions at the lowest possible cost would be quick freezing units in Alaska which can transport the fresh frozen fish to Seattle for either canning or refreezing. This sort of arrangement, however, is easily 25 years away, if coming at all.

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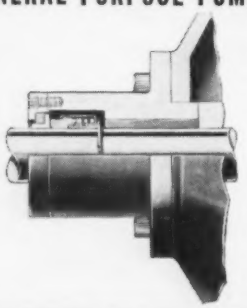
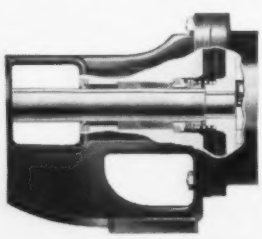


54 HEAVY-DUTY PUMPS



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The following is the Alaska salmon pack from Fish and Wildlife Service figures, at 48 net pounds to the case:

Species	1953	1954
King	55,360	51,868
Red	971,869	734,081
Pink	943,241	1,145,436
Chum	785,942	1,001,829
Coho	125,671	162,709
	2,882,083	3,095,923

Research of the Sockeye Commission paid off this year for Pacific Northwest fishermen. The run of sockeye in Puget Sound was the biggest since 1913. Eight years of research built a conservation program based on intimate knowledge of the Columbia watershed and the spawning habits of sockeye. This is one of the most astounding successes that conservation researchers have ever had. Northwest fishermen believe that if a similar program were instituted in Alaska, even on a much smaller scale, salmon runs reminiscent of the early days would result.

Tuna

The domestic production of canned tuna will set a new record in 1954. Sales and consumption of tuna approximated 1953's sales.

Western Outlook

AUTOMOBILES

Western assembly falls way off, but more and more parts are being purchased locally.

WEST COAST assembly dropped in 1954. Company figures follow:

Company	1953	1954
Ford		
Ford cars	139,657	134,955
Ford trucks	24,982	28,738
Mercury	40,964	32,883
Lincoln	5,995	4,807
Total Ford production	211,598	201,383
Chrysler		
Plymouth	55,438	24,038
Chrysler	9,514	3,553
DeSoto	10,321	3,401
Dodge cars	21,539	5,139
Dodge trucks	8,122	3,822
Tot. Chrysler production	104,934	39,953
General Motors		
Buick, Olds., Pontiac	*	102,187
Chevrolet	*	165,227
Total General Motors	299,677	267,414
Nash	10,966	*
Studebaker	23,000	9,357
Willys	8,783	7,300
Total cars and trucks assembled	658,958	525,407

* Figures not available.

Western Outlook

MEAT PACKING

Large increase in cattle slaughter boosts 1954 production over that for 1953.

OUTPUT of livestock and poultry for the 11 Western states was higher in 1954 than in 1953. There was a huge increase in the slaughter of cattle and calves while hog slaughter was reduced to a rather low level.

The previously high prices for cattle and low prices for hogs managed to reverse themselves during 1954. As a result, a great many feeders of cattle lost money or at least failed to earn a profit. Declines in price of feeder cattle replacements lagged behind those for finished cattle.

Commercial slaughter of livestock in the 11 Western states

1953

Animals	Number (1,000 head)	Liveweight (1,000,000 lb.)
Cattle	4,144	3,997
Calves	882	234
Sheep and lambs	3,547	349
Hogs	4,263	969

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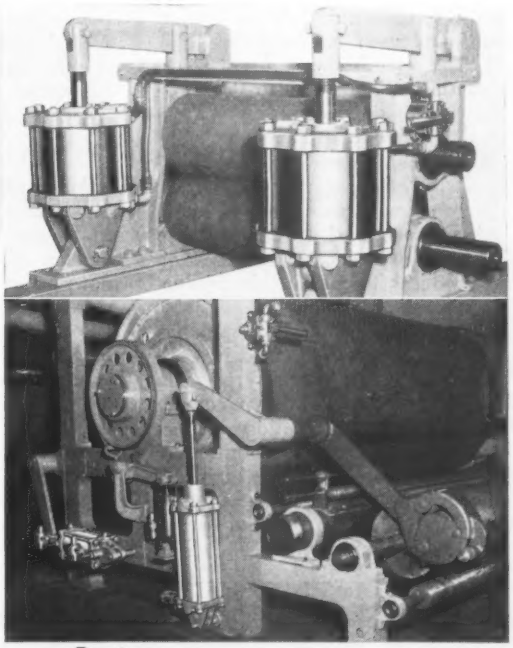
The David Gessner Company, Worcester, Mass., manufacturers of modern cloth finishing equipment, employs NOPAK Air Cylinders in its sizing machines to raise and lower heavy rollers, and, in some cases, to equalize roller pressures. The examples pictured may suggest how you, too, can use NOPAK Cylinders, controlled by NOPAK Operating Valves, to build accurate, simplified machine movements into your plant equipment, or into machinery that you manufacture for resale.

The NOPAK Application Manual shows you how NOPAK Valves and Cylinders are being used in all types of industry, in many types of machinery and equipment for pulling, pushing, lifting, lowering, clamping, positioning. If you haven't seen a copy, ask your NOPAK representative, or write.



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Western Outlook

DAIRY PRODUCTS

Milk surplus continues but dairymen search for answer in improved merchandising.

THERE is still what appears to be a surplus of Grade A milk in the Pacific Coast states, although only two years ago there was a milk shortage. There is still a shortage of almost all other dairy products.

Grade A milk is a Class 1 dairy product and as such has first priority, bringing the highest price with the lowest production cost. In the same category with milk is ice cream, since there is a daily city demand for both of these dairy products.

After the dairyman has produced as much of these items as possible to maximize his profits, he turns his attention to evaporated milk, then cheese, and lastly butter and dried milk. As a consequence, there is at present a surplus of whole milk and a shortage of raw milk for the remaining less profitable dairy products.

As a direct outgrowth of this condition, there have been several movements having mainly to do with increased producer interest in merchandizing. In California this interest has manifested itself in two ways:

1. The establishment of a state organization of the American Dairy Assoc. whereby dairymen support a national merchandizing campaign.

2. Increased interest among dairymen (who find a large portion of their milk going to surplus uses) in establishing direct markets such as cash and carry drive-in markets allowing the producer to market his production at retail prices.

Bulk handling of Grade A milk has become pretty well accepted in California, but in the past several years there has been a noteworthy increase in the number of installations of pipeline milking systems as labor saving devices on dairy farms. The high cost of labor puts increasing pressure on farms and factories to make use of labor saving equipment.

The past year has seen an outstanding growth in large corporations through merging of smaller companies. The outstanding example was the merger of Foremost Dairies with the Golden State Co. and numerous dairy companies in California and elsewhere in the country.

There continues to be a good deal of interest in low calorie dairy products such as uncreamed cottage cheese, skimmed milk for beverage purposes under a number of trade names, and others. Among new products beginning to make their influence felt in the market are powdered cream-like foods for use in coffee, instant dry milks, and the recently announced fresh-flavored evaporated milk.

Instant milks have caused a great deal of interest throughout the industry and promise to become an important factor in marketing dairy products. Instant milks have added utility to a product that already had high nutritional value and had acquired a good deal of household acceptance. To date, instant milks have been limited to fat free products only.

California is probably the nation's biggest producer of cottage cheese, but most of its butter and other cheeses are imported from the Mountain states and the Midwest. At the present time Idaho is producing more butter than California. Its production facilities easily supply fresh milk demands, leaving considerable milk to be turned into butter and cheese, which can be easily shipped.

In Oregon

Manufacturers are not as yet selling instant soluble non-fat dry milk in Oregon, although a considerable amount of this type of dry milk is now being sold in the state's food stores. Some authorities believe that before long all non-fat dry milk sold in retail packages will be the instant soluble type. Oregon manufacturers are working on the development of that type of powder.

In the Portland area 1,200 milk producers handle delivery to the metropolitan dairy plants. Of these, 435 have installed bulk milk cooling tanks. These producers furnish approximately one-half of the city's milk supply. Four large distributors have discontinued receiving their milk in cans and several are planning to discontinue in the near future. It is expected that the economics of the situation will probably force most distributors in that area to use bulk milk tanks. It has been estimated that there are some 750 tank installations in Oregon and Southern Washington.

With the loss of the State Milk Marketing Act, producers and distributors will be forced to cut costs wherever possible. This may result in lower production for the future. It has been reported that sales volumes of commercial feed stuffs are down considerably over previous years.

During the past year Carnation Co. introduced on the general market a granular, instantly dissolving dry milk. Dry milk powders thus far available generally have been hard to dissolve, often cake up in the container, and create a foamy surface when mixed with water.

At about the same time, Borden's Food Products Co. came out with an instant non-fat dry milk also designed to overcome the disadvantages.

Western Outlook

MARGARINE

Production and consumption still going up. Only Calif. bans restaurant use.

MARGARINE production and consumption alike continues to increase in the Western states. Production of a basic ingredient, refined cottonseed oil, reached about 850,000 lb. in 1954 in the Western states. The San Francisco and Los Angeles areas contain eight margarine plants. Total product production and consumption are not available, but industry reports indicate the Pacific Coast may be second only to the Chicago area in output and that margarine consumption is probably at a record high here as in most parts of the United States.

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Western Outlook

CEREALS

Flour, macaroni, crackers, improve handling, processing. Grain crop looks good.

THE West's flour mills enjoyed a prosperous 1954 and expect an even better year in 1955. Pneumatic flour handling is replacing bucket elevators and screw conveyors, and bulk flour cars are becoming more prominent, although so far they have not been tried by Western bakers. Western grain storage facilities are now completely developed, but another large crop in the Northwest may cause a temporary shortage. Macaroni and noodle production for the nation in 1953 was 1,027,940,600 lb., with a value of $238,340,000. The West, with 46 macaroni manufacturing plants, accounted for about 10% of this total. Cracker manufacturers complain about lack of development in packaging machinery, claiming that present machines will not run at high speeds.

Western Outlook

CITRUS FRUIT

Industry running in good shape. Lemon harvest is second largest in history.

THE citrus industry in California and Arizona is in a basically sound condition, Paul S. Armstrong, general manager of Sunkist Growers, reported at the sixty-first annual meeting of the citrus marketing cooperative in early December. Price levels are generally adequate to sustain the industry and its individual producers; distribution is extensive and quite complete.

The lemon harvest was the second largest in history, but orange yields varied widely from a normal crop in some areas to virtually a crop failure in others.

Of the total California-Arizona citrus shipments, Sunkist handled 73.3% of the fruit moving in fresh fruit channels. By varieties, this amounted to 40,843 standard cars of oranges, 17,949 lemons, and 2,988 grapefruit—a total of 27,500,000 packed boxes. In addition to fruit shipped fresh, 27,700 cars of all varieties were used by the two processing plants affiliated with Sunkist, Exchange Orange Products Co. and Exchange Lemon Products Co. in manufacturing a wide variety of citrus products.

The overseas sales record of the past year was surprisingly good for valencia oranges, which present the greatest export opportunity because they reach Europe at a time when oranges from nearby Spain, Italy, and Portugal are not in full season. Grapefruit shipments substantially increased to a total of 250,000 boxes, with practically all shipments being small-sized fruit which represents a marketing problem in the domestic market. For the first time in postwar years, California citrus entered the markets of England, Ireland, and Norway.

In Southern California the rapid conversion from an economy based upon agriculture to one based on industry has required land for homesites and factories formerly devoted to citrus and other crops. It is estimated that 46,000 acres of citrus have been removed during the last six years.

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Western Outlook

FROZEN FOODS

Industry concentrating on educational programs, consumption continues to grow.

CONTINUING customer acceptance of frozen food has pushed Western production steadily upward with the West now packing more than 60% of all frozen fruits and vegetables.

The limitation of frozen storage facilities and retailer display cabinets and walk-in coolers has been eased somewhat and the industry is concentrating its efforts on an educational job designed to further increase frozen food demand.

This educational job entails selling the general public on the convenience, ease, variety, and novelty value of frozen products over their less expensive fresh counterparts. Although more frozen foods were sold to hotels and restaurants in four months of 1954 than the previous 15 years, there is still a large untapped market in this field and for hospitals and other institutions as well.

Another problem of the frozen food industry is that its market is about five years ahead of its distribution system. An intensive campaign of advertising and merchandising frozen foods is believed to be the key to selling their increased savings and convenience.

Retail markets and schools seem to prefer cooked frozen fish while hotels and restaurants, having their own facilities, prefer uncooked fish. Frozen fish packers are promoting the use of fish in place of more expensive meat. Fish consumption is about 20 lb. per year while the average American eats 150 lb. of meat per year.

Poultry freezing in California has grown over the past two years by leaps and bounds. At present, frozen poultry accounts for 20% of poultry sales, and is still growing. One of poultry merchandising's greatest problems is the difference in demand for various parts. Price is not always able to control relative demand, often providing the industry with perhaps a shortage of chicken necks and a surplus of wings. Consumer preferences are carefully charted in an effort to coordinate demand with supply most efficiently.

In the space of 20 years production of frozen foods has increased nearly 1100% and the industry predicts continued rapid expansion. All indications point to a greater demand for frozen poultry and fishery products. Increased consumption of these foods during the last few years bears evidence that the public's preference for these items is growing.

The broccoli pack for 1954 is somewhere around 1,000,000 lb., compared to over 4,000,000 lb. at the same date in 1953. Unusual transfer of raw materials to the fresh market, away from usual freezer outlets, has been mainly responsible.

Field checks on cauliflower indicate that only a negligible amount was put through the freezers in 1954. This compares to a 1953 pack of 7,000,000 lb. The brussels sprouts pack is running behind 1953.

The most important developments for 1954 were new freezer rail cars, frozen baked goods (frozen pies and dinners), frozen soups and fish sticks.

A new method for processing the sound culls in strawberry freezing plants has resulted in better ultimate products (especially jellies) and also economies in shipping and handling.

After several years of laboratory and pilot plant research on dehydrofreezing of fruits and vegetables at the Western Utilization Research Branch, commercial adaption of the method has started. First commercial trials have revealed advantages for dehydrofrozen foods in re-manufacture and in large food-service establishments—with consumer packs a possible later development. Dehydrofrozen pimento freeze and cheese products, apricots for preserve manufacture, peas and carrots for soups, apples for the bakery trade, and various products for quartermaster or institutional use have undergone, or are undergoing, trial at present.

Mellorine, a product similar to ice cream but made with vegetable fats or oils instead of butter fat, is now being produced in six California plants, 11 Montana plants and 15 Oregon plants. These plants began production in 1953. In 1953, California produced 1,130,000 gal. Oregon reported 261,000 gal. and Montana 79,000 gal.

Despite a relatively cool summer in the heavily populated East, 16% more frozen lemonade was sold during the season than during all of 1953.

With an average crop in prospect for 1955 and with the hope of average or better summer temperatures throughout the United States, frozen lemonade is expected to show another substantial gain in sales.

Apparently no lemonade is being served in restaurants for two main reasons: (1) the problem of dispensers, and (2) unfamiliarity of proprietors with the new lemon products.

Western Outlook

CANNING

Horticultural practices improve crops, production and consumption balance better.

FRUIT and vegetable canning in the West, once a highly hazardous operation because in big crop years packers ended up the packing season with far greater stocks than they could market profitably, seems to have reached the stage where production and consumption are more nearly in balance all the time.

Increased crop yields through better horticultural practices and greater recovery of finished products from the fresh material have enabled both growers and packers to get greater volume. For example, the California cling peach pack for 1946 and 1953 were about the same size, about 17,200,000 cases, but it took 529,900 tons of green fruit from 48,027 bearing acres to produce the pack in 1946, and only 510,600 tons from 47,441 acres in 1953.

The increased output within the cannery is due in large measure to machinery improvements which cause less wastage of raw material. For the new Filper cling peach pitter a recovery of five more cases per ton is claimed. Instead of scooping out the pit with a knife, with consequent wastage, this machine removes the pit by a half rotation of two rubber cups holding the fruit, somewhat after the manner of twisting an apple in halves with the two hands, leaving that portion of the flesh closest to the pit.

Semi-automatic apricot pitters are nearly tripling the output of a woman cutting apricots by hand. The time-honored apple peeling principle is being applied to pears by the new Atlas machine, in which the pear rotates and the knife follows its contour. Recovery is estimated as upwards of 15% greater than earlier pear peeling machines. An improved grape stemmer is still another addition to the group of new devices for preparing fruit for canning. This has possibilities for use on blueberries and cranberries as well as grapes.

Greatly increased yield of fancy grade tomatoes has been made possible by the Magnuson peeler, which strips the peel off by hot gases at 300 miles an hour velocity, thus leaving intact the layer of flesh next to the skin containing red pigment which had to be partly sacrificed under previous methods of peeling.

Electronic sorting devices which will greatly speed up the preparation process are due to come into greater use, and within four or five years probably will be used to a considerable extent in sorting for defects and color. The obstacle in development appears to lie in perfecting the mechanical part of the device to match the speed of the electronic features.

Pressure cookers are now being designed for wider can size ranges, which the rise in popularity of the No. 303 can and the fading away of the No. 2 tall made inevitable. It is now possible to run two grades of the same size can almost simultaneously.

In the harvesting end, Food Machinery and Chemical Corp. and the Blue Lake Bean Canners Assoc. are sponsoring research on the development of a mechanical bean pole harvester to reduce handling costs. Another new device under development is a pea combine that picks the vines, sorts out peas, and returns vines to the field.

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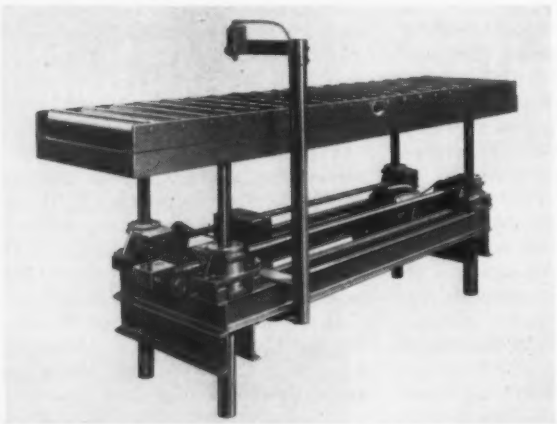


Portelvators are available in many sizes, stationary or portable, with operating features from completely manual to completely automatic. Unit illustrated was designed for use in a steel mill to make it possible for one man to handle long sheets of steel being fed into a shear. Load capacity is 10,000 lb. Lift is powered by a 5-hp. motor. *Hamilton Tool Co., Hamilton, Ohio.*

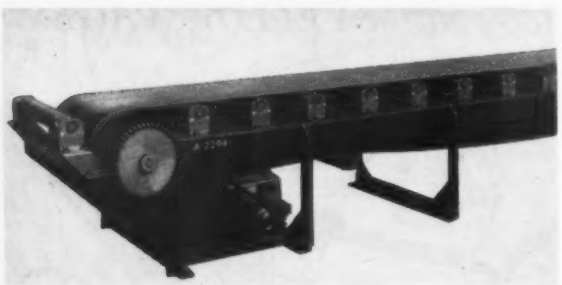
Solve storage problems

Platform stacking rack simplifies problems of handling unwieldy objects such as forgings, stampings, etc., and offers maximum storage and handling efficiency. All-steel welded construction, with angle iron reinforced legs. Built to required dimensions and capacity. *Palmer-Shile Co., 16018 Fullerton, Detroit 27, Mich.*

Hot water news

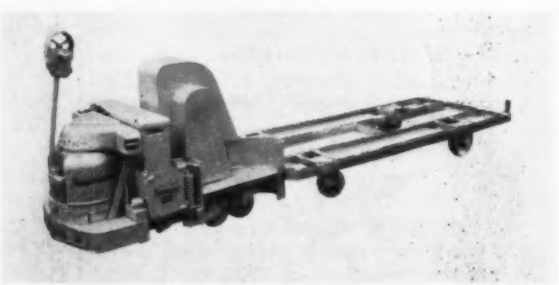
New Crane-Monel automatic gas water heater, available in a variety of models for use with all gases and all waters, has tank built of solid, rust-proof lifetime Monel. Commercial models, in two sizes, have storage ratings of 60 and 80 gal., recovery ratings of 50 and 80 gal. per hr., and one-hour performance ratings of 110 and 160 gal. Duo-Temp accessory permits use of water at two different temperatures. *Crane Co., 836 S. Michigan Ave., Chicago 5.*

Heavy-duty conveyor for bags and cartons



Saco sectional bag conveyor is made up of standard flat belt conveyor units designed to give economical service on medium to heavy-duty applications. It is available in 18- or 24-in. belt widths with 20-ft. interlocking sections. Drive units are equipped with tail shaft mounted sprocket for powering driven units. Standard roller spacing is 16 in., but decking is punched for 8-in. spacing if required. *Stephens-Adamson Mfg. Co., Aurora, Ill.*

Tractor with universal grip



Uni-Grip tractor will couple to any trailer of 5½ to 12¾ in. clearance from floor, without use of special adaptors. Quick coupling is performed by hydraulically operated draw bar, controlled by a single button in operating handle. Disconnecting is by means of conventional Transporter lowering lever. Draw bar pull of operator-led tractor is 175 lb. normal and 800 lb. ultimate. *Automatic Transportation Co., 149 W. 87th St., Chicago 20*

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NEW EQUIPMENT

. . . Begins on page 118.

New lining for tanks

Special white rubber compound developed by Goodrich is applied here to 3,100-gal. tank for processing special high quality food-grade phosphoric acid. Lining material resists discoloration of the acid, which is used in preparation of food products. Quarter-inch sheets of rubber are rolled into place over a rubber adhesive which bonds the rubber to the metal. *B. F. Goodrich Co., 5400 E. Olympic Blvd., Los Angeles 22*

Bear hug for fork trucks

New hydraulic carton clamp for use on Elwell-Parker electric fork trucks permits handling wide variety of cartons without palletizing loads. Choice of clamp arms is available for handling products ranging from solid cartoned merchandise such as canned goods, soap, or oil cans, to cartons of noodles or breakfast cereal, egg crates, and other fragile items. Side-shifter device is also offered, to permit accurate spotting of loads in crowded areas. *Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.*

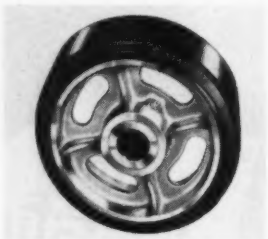
Recommended for test hook-ups

New addition to Parker line of tube fitting is a long union, provided in both Triple-lok flare type and Ferulok flareless type. New union offers important replacement advantage, because its overall length is exactly the same as that of union tee, male outlet tee, and union cross, facilitating test hook-ups. *Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio*

Automatic numbering machine

Here is a new automatic numbering machine, the Force Paragon Model 1C, developed for use with carbon snap-out forms. Featuring a hard-rubber impression bed and a rubber base for elimination of noise and ease of operation, it will number consecutively, in duplicate, or repeat. *Force Western, Inc., 216 W. Jackson Blvd., Chicago.*

A real wheel



Samson wheel is made of heavy-duty rubber permanently bonded to precision cast and machined aluminum alloy wheels. Manufacturer guarantees that rubber will not tear loose from wheel under recommended operating conditions. Sizes range from 5 to 20 in. All wheels are equipped with Alemite fittings and cast-in grease wells where required. *Fargo Rubber Corp., 137 E. 58th St., Los Angeles 11*

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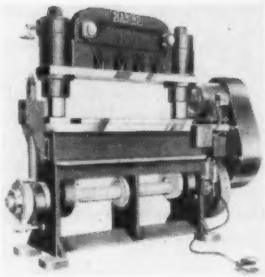
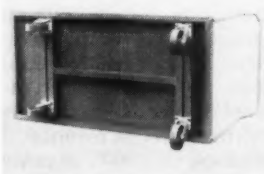
MAYWOOD (Los Angeles) 5276 Atlantic Blvd. LOgan 8-4014 | SAN FRANCISCO 7 510 Bryant St. SUtter 1-1341 | SEATTLE 4 307 Maritime Bldg. MUtual 1922

50-ton punch press



New Multi-Max punch press with bed area of 16 x 36 in. now available; and other 50-ton presses in bed and ram lengths between posts of 24, 48, 72, and 84 in. are slated to be introduced soon. Presses are designed for multiple and maximum stamping production and drawing up to 6-in. stroke; they are also used for press brake work, power shearing, and cutting strips or other shapes in felt or fiber materials with steel rule dies. *Diamond Machine Tool Co., 5111 Coffman-Pico Rd., Pico, Calif.*

Hercules tougher trucks

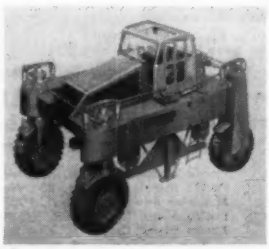


Six models of all-steel platform trucks are introduced in Hercules line. One-piece steel platform and inner chassis provide extra strength and even load distribution over entire platform. Painted bright blue, Hercules trucks come in sizes and capacities ranging from 400 to 8,000 lb. *Bacon Metal Products Co., 1400 West Washington Blvd., Montebello, Calif.*

Electric truck for high-stacking

Improved design of SpaceMaster Model "M" electric truck has narrower width at operator's end—32 in. wide — which permits stacking 32-in. wide pallets in bulk storage without loss of space between rows of pallets. Width across straddle arms at front end of truck can be varied to accommodate pallet widths. Magnetic controller gives truck three speeds forward and reverse with dynamic braking. *Lewis-Shepard Products, Inc., Watertown, Mass.*

For taxiing steel

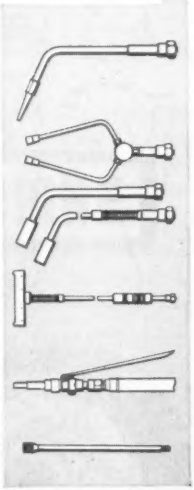


New 50,000-lb. material carrier is specially engineered for the materials handling needs of iron and steel industry. It is available in swing shoe model (SC-50) or rigid shoe model (RC-50) in six standard sizes, with twin-disc torque converter drive. *Gerlinger Carrier Co., Dallas, Ore.*

*** Buy Victor and get Torch Versatility**

Cutting with VICTOR Model 300 Series Torch Butt and Model 2450 Cutting Attachment; cuts to approximately 8"

The versatility of VICTOR torches means you can buy exactly what you need for today's job, then add other nozzles, tips and attachments as required. Your equipment grows with your needs; stays custom-fit to your work. For example, here are a few of the 34 standard attachments for VICTOR 300 Series Torch Butts.



Welding . . .
Here's one of 10 standard single-tip nozzles available for general welding and preheating.

Heating, Brazing . . .
You have your choice of 11 standard multiple-tip or multi-flame nozzles for preheating, brazing, silver soldering, etc.

Descaling, Flame Priming . . .
Save time and money with VICTOR attachments that fit your exact needs.

Automatic Gas Saver . . .
Shuts off welding gas, keeps pilot light on, saves as much as 75% of total gas consumption.

Nozzle Extensions . . .
Let you handle hard-to-reach jobs, keep you

Start *right*. Buy the versatile VICTOR torch that grows with your job. See it at your VICTOR dealers *today* . . . or write NOW for Catalog 20.

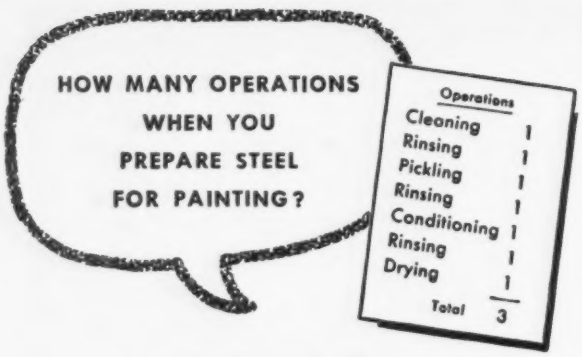
16

VICTOR EQUIPMENT COMPANY VICTOR for welding

Mfrs. of welding & cutting equipment; hardfacing rods; blasting nozzles.

844 Folsom Street
SAN FRANCISCO 7

3821 Santa Fe Ave.
LOS ANGELES 58



What's wrong with that addition? How can seven operations add up to three?

It's easy when Oakite Composition No. 33 removes rust or heat scale *at the same time* it removes oil *at the same time* it prepares steel for lasting paint adhesion.

By combining cleaning, pickling and paint conditioning into one operation—and eliminating two rinses—you save the time, tanks and solution for four operations.

New metal cleaner removes oil and rust in one operation

FREE For booklet describing the Oakite Composition No. 33 process, write to Oakite Products, Inc., 1001 E. First St., Los Angeles, or 681 Market St., San Francisco, Calif.

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MATERIALS · METHODS · SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

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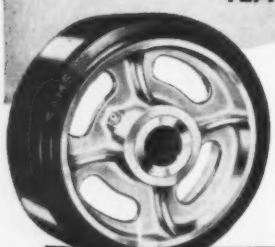
SAMSON WHEELS

Guaranteed not to TEAR LOOSE



SAMSON Heavy Duty Rubber Wheels are permanently bonded to precision cast and machined aluminum alloy wheels. Wide range of sizes 5" to 20" dia. Better because a rubber manufacturer makes rubber products best. For name of nearest SAMSON distributor write Fargo today!

Distributors now being appointed. If you want inquiry in your area referred to you—write Fargo today!

SAMSON WHEELS product of
FARGO RUBBER CORPORATION
137 E. 58th St., Los Angeles 11, Calif.

NEW EQUIPMENT

. . . Begins on page 118.

Pneumatic hammer kit

Fitted, steel carrying case contains pneumatic hammer, chisel, scraper, rivet cutter, and panel cutter—a handy kit for cutting sheet metal, bolts, and rivets; for driving out bolts, rivets, and pins; for scraping undercoating, paint, and dirt, and breaking spotwelds. Skil's advanced design pneumatic hammer features a new style hammer barrel, with removable inner sleeve and replaceable nozzle, for lower maintenance costs. Model 1004. *Skil Corp., 5033 Elston Ave., Chicago*

"Scotchply" glass-reinforced plastic

New plastic material is designed for mass production of reinforced plastic parts and structural members. Advantages claimed by manufacturer are uniformity of properties in all sheets, as a result of controlled manufacturing process, and formability of uncured sheet stock, eliminating need for handwork in lay-up or production. Three forms of new material are now available: one for applications where strength is desired in just one direction; another where strength relationship is required in two principal directions; a third where equal strength is desired in all directions. Scotchply reinforced plastic may be hardened or cured merely by heat and light pressure; no further chemical treatment is required. *Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul 6, Minn.*

NOW! BUILD YOUR OWN Pallet Racks, Rails and Shelving... with

Nu-Rail SLIP-ON FITTINGS

AN ENTIRELY NEW METHOD OF FITTING PIPE

NO WELDING!
USE ALL PARTS OVER AND OVER AGAIN!

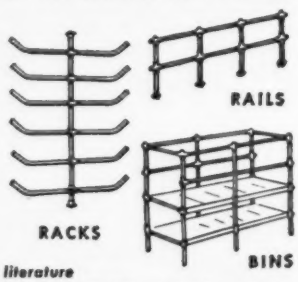
USE ANY I.P.S. PIPE OR TUBING . . .
NO PIPE CUTTING . . . NO WELDING

Build them when and where you need them

SAVE MONEY, too!

Just a few examples of Nu-Rail versatility! If it's made of pipe . . . you can make it BETTER, FASTER AND FOR LESS . . . with Nu-Rail!

Distributed coast to coast.

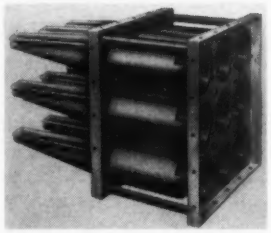


Write for literature

THE HOLLAENDER MFG. CO.
3843 Spring Grove Ave., CINCINNATI 23, OHIO

Pacific Metals Co. Ltd., 3100—19th St., San Francisco, Calif.
Pacific Metals Co. Ltd., 261 West 5th South, Salt Lake City, Utah.
McKinley Equipment Corp., 1003 Santa Fe Ave., Los Angeles, Calif.
Pacific Metal Co., 303 N. W. Park Ave., Portland, Ore.
Pacific Metal Co., 4150 First Ave. South, Seattle, Wash.
THE HOLLAENDER MFG. CO., CINCINNATI 23, OHIO

New twist in dust collecting



Key to this new AMER-clone dry granular dust collector is a conical inlet which imparts a swirling motion to dust particles while permitting clean air to travel straight through the Type G tube. Nine AMER-clone tubes are combined in a standard modular cell (shown at right), which has a nominal rating of 3,000 cfm. with a face area of 20 x 20 in. Any number of cells may be combined to meet required capacity. This design requires less space, is unusually resistant to abrasion, and can handle wide ranges of air volume and dust concentrations. *American Air Filter Co., Inc., Louisville 8, Ky.*

"Good judgment" on the production line

Here is a production tool for quality control in food processing: the Model "F" Agtron, first developed for measuring color of raw tomato pulp and now used as an appearance meter for a variety of food products, from whole grain barley to paprika and citrus juice. Two permanent plastic color standards set the range for product to be graded. The Agtron then assigns direct numerical readings to the color or appearance of product samples. *Magnuson Engineers, 509 Emory St., San Jose 10, Calif.*

New design in impact wrench

New "Squatty" wrench is offered for hard-to-get-at production and maintenance jobs. Wrench is 8½ in. high, with spindle offset of 2⅛ in. It is designed with a flat back to enable operator to brace it against his chest or shoulder: is made of aluminum alloy: weighs only 19¾ lb.: and delivers 1,800 impacts per minute. *Mall Tool Co., 7725 S. Chicago Ave., Chicago 19*

Color coatings for molded plastics

Duolite 362 is a new line of colored polyester gel coatings for polyester glass reinforced lay ups or moldings. Resins are strong, fast-setting coatings used against the mold to give permanent, dense color finish to molded part. Available in red, white, blue, yellow, green, light blue, light green, and gray. *Chemical Process Co., Box 829, Redwood City, Calif.*

Extra feature on submersible pump

BJ Subette pump is claimed to have only non-mechanical oil pressurizing system offered in submersible pump. "Pressurmatic" is a device for providing automatic sealing pressures to oil in motor without use of mechanical devices. Available motor sizes range from 5 to 35 hp. Recommended for primary water supply and booster applications for industrial plants, dairies, refineries, and canneries, as well as other uses. *Byron-Jackson Co., Box 2017, Terminal Annex, Los Angeles 54.*

As much as 81% saved on intricate Arwood Investment Castings

Unlimited freedom of design and substantial savings are by-products of the Arwood investment casting process. Applications are virtually limitless, with many former sub-assembly jobs now being cast as single units. Moreover, complicated parts can now be cast in unmachinable alloys.

Our engineers will be pleased to go over your parts problems with you and help cut your own costs. Why not submit parts or prints to us for quotations? Consultation is free of obligation, of course.

Write for free literature describing the investment casting process.

CASE STUDY

DESIGNATION: Impeller for flowmeter.
METAL: Magnesium, Dowmetal C.
QUALITY CONTROL: Produced under radiographic control.
PARTS: Designed and cast as single unit.
ADVANTAGES: Fine grain and smooth surfaces. Annular passages without draft. Now standardized because of top quality at bottom cost.

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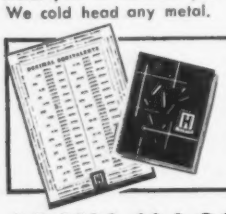
HASSALL Cold Headed Parts and Fasteners

Our BIG BUSINESS is making small parts by the thousands . . . cold forged parts which are usually lowest first cost, lowest assembly cost, and strongest for longest service life.

A quotation from us won't cost you a cent but it's very likely to show you a much LOWER COST source of supply for any small metal part or fastener you are using in your product. We cold head any metal.



NEED a good 3 color decimal equivalent chart? Yours without obligation . . . just drop us a card. Complete catalog on request.

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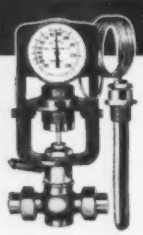


For Steam Heated VATS or TANKS

Quickly pays back its cost by eliminating OVER-heating, boil overs, wasted heat and damaged products. Powers No. 11 Temperature Regulator shown above is self-operating, easy to install and gives many years of dependable control. It has an easy to read 4" dial thermometer which indicates temperature of liquid being controlled and makes it easy to adjust regulator for various temperatures. Bulletin 329 describes its points of superiority. Write for a copy. (c12)

THE POWERS REGULATOR CO.

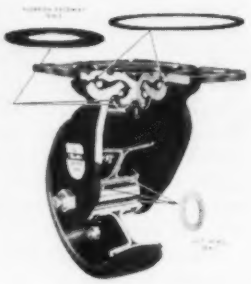
Skokie, Ill. • Offices in 60 Cities • See Your Phone Book

Over 60 Years of Automatic Temperature and Humidity Control

NEW EQUIPMENT

. . . Begins on page 118.

New sealed casters



Six different models of Rapistan industrial casters are now available with sealed raceways and wheel bearings. Seals keep lubricants in and protect against moisture, steam, acids, grease, grit, and chemicals. Load and thrust raceways of swivel casters are fitted with Neoprene seals; felt seals for wheel bearings are available on micro-steel, forged steel, mold-on rubber, and MB industrial demountable wheels. Rapids-Standard Co. Distributed by: *M. E. Canfield Co., 419 E. Third St., Los Angeles.*

Nameplate aid

Metal-Cal etched aluminum nameplates are now available in a pre-masked form for use on unpainted surfaces. Complete masking permits painting the article after label is applied, thus building up paint around the edge of the label and making it an integral part of the item. Masking is easily stripped off after painting. Backed by pressure-sensitive adhesive, Metal-Cals may be applied to any smooth, curved or flat surface. *C & H Supply Co., 415 E. Beach Ave., Inglewood 3, Calif.*

Explosion-proof wound-rotor motor

New Allis-Chalmers motor, is said to be first rib-type enclosed, fan-cooled wound-rotor type made with slip rings, brushing rigging, rotor, and stator inside a single frame enclosure. New unit is available at 1,800 rpm. and slower, in frames 284 to 505, in standard enclosed or explosion-proof construction. Recommended where very low starting current, high starting torque, smooth acceleration, jogging or variable adjustable speed dictate use of a wound-rotor motor and where moist, dirty, corrosive, or hazardous atmospheres require a totally enclosed motor. *Allis-Chalmers Manufacturing Co., 1088 S. 70th St., Milwaukee, Wisc.*

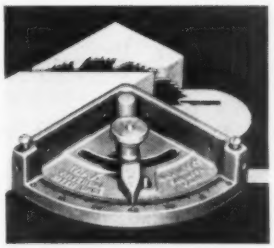
SULPHURIC ACID
for the west
66° BAUME 20%
98% OLEUM
and special grades

Garfield CHEMICAL & MFG. CORP.

ESTABLISHED 1916

700 PACIFIC NAT'L BLDG.
SALT LAKE CITY, UTAH

Power tool protractor



Max universal miter gage is an attachment for power tools which differs from conventional protractors in that it has two working faces at right angles to each other. This permits angle cutting or grinding with a full range of single and complementary angles without change of settings. A radius arm on the device permits protractor to swivel near the corner of adjacent faces for wider usefulness and greater accuracy. *Max Manufacturing Co., 138 Stockton Ave., San Jose 26, Calif.*

Seal lubricants for threaded fittings

"Big D Dope," new thread compound, is said to provide permanent lead-plating, island high, permitting repeated easy assembly and disassembly of thread connections without re-doping and without damage to threads. It is recommended for hydraulic lines, drill pipe and tool joints, nuts and studs on pumps and engines, large plug valves, fork-lift and elevator guide channels, and as a packing sealer and steel-cable lubricant. *C. H. Dragert Co., Dallas, Tex.*

Plastics testing machine

New machine tests flow characteristics of thermosetting plastics material by using ASTM standard cup mold method. Machine is self-contained unit, with standard heating plates, motor driven pump, motor, starter, and complete control panel. When equipped with dies, it also accommodates thermoplastics material. *Watson-Stillman Fittings Division of H. K. Porter Co., Inc., 201 Aldene Rd., Roselle, N. J.*

Extendable forks for "boarding-house reach"

RSAT-3 Warehouser fork lift truck has extendable forks which reach beyond outrigger wheels to pick up and deposit loads. Forks slide forward 20 in., to provide 30 in. of effective length beyond wheels. After load is on forks, they are retracted to bring load back against fork carriage for transportation. Warehouser has rated capacity of 2,500 lb., 83-in. overall height, and 126-in. maximum fork lift. *Yale & Towne Manufacturing Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.*

Industrial and Protective Coatings

that wear better!

Especially formulated to protect metal, wood, concrete—submerged or not; acid and alkali resistant. Colors available. *Full free details, write for:* **Folder 575, Dept. 8.**

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27 So. Park, San Francisco 7

Call Nutting For TRUCKS WHEELS CASTERS

FIG. 1452 Heavy duty bar handle platform truck

FIG. 1551-X "Auto-Load" Barrel Truck

FIG. 1152 DPL Light weight 2-wheel utility truck

FIG. 1011 Balance-type platform flake truck

FIG. 16 Western Pattern with Steam Bent Handles

FIG. 219 Golden Gate Pattern

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Since 1891 **NUTTING TRUCK AND CASTER COMPANY**

1726 Division St. W., Faribault, Minn.

TOUGHEST WHERE WEAR IS ROUGHEST

Standard abrasion tests show Tripl-Palm will outwear by many times the usual coated glove. It's an extremely heavy Vinyl coating on the palm (main point of wear) that does the job, yet it is still a soft and pliable glove for hand comfort.

NO SEAM HERE The wing thumb construction multiplies glove life. All sizes and styles available from your Jobber or write direct.

In Canada, Safety Supply Co., Toronto

Dept. A

Western Division, 544 Market Street San Francisco 4, California

THE SURETY RUBBER CO.

CARROLLTON, OHIO

HELPFUL LITERATURE

FOR YOUR CONVENIENCE the company address follows each item.

Describes magnetic rapping system

Features and advantages of a new system of continuous, intensity controlled rapping for electrostatic precipitators are outlined in this folder. Detailed diagrams and text show principle of operation and wiring arrangement. *Research-Cottrell, Inc., Bound Brook, N. J.*

Shaft mounted drive data

Here's detailed information on shaft mounted gear drives, designed for machines requiring input speeds between 420 and 10 rpm. in horsepower range between ½ and 30 hp. Eight-page Bulletin 7101 contains design data, selection tables, dimensions, weights, and installation phototographs. *The Falk Corp., 3001 W. Canal St., Milwaukee 8, Wisc.*

"Packaged" air control unit

Bulletin AV 300R illustrates and describes Bellows Electroaire valve. Installation photographs, dimensional drawings, and specifications are included. *The Bellows Co., 222 West Market St., Akron Ohio*

Data on grinder dogs

This new three-color flyer covers improvements made on cam-action grinder dogs. Capacities and prices of nine available sizes are included. *Ready Tool Co., 554 Iranistan Ave., Bridgeport, Conn.*

Cold pressure welding

New general info brochure covers Utica Koldweld process for cold pressure welding of non-ferrous metals. Brochure describes KL-10 (for lapweld) and KB-14 (for buttweld), hand-size plier-action tools, which produce welds in seconds. Photos illustrate data on Koldweld tools and dies, weldable materials, results of lab tests, and samples of welds produced in industry. *Utica Drop Forge & Tool Corp., Utica, N. Y.*

Vinyl butyral resins

Information on properties and applications of Bakelite vinyl butyral resins is compiled in new 27-page booklet. Numerous graphs and tables provide data on these resins, which are used as wash primers or metal conditioners, wood and metal finishes, adhesives, and cloth coatings. Five types of wash primer, or metal conditioner, are described in detail. 11. *Bakelite Co., 30 E. 42nd St., New York 16, N. Y.*

"Steel for Western industry"

Here is a new booklet on U. S. Steel Columbia-Geneva division's facilities. Locations of company's three mills—at Pittsburg, Torrance, and Geneva—are shown, and the products of each listed. Special services are cited, and growth of the Western market discussed. Booklet is well illustrated with photos and charts. 1119. *Columbia-Geneva Steel Division, U. S. Steel Corp., Russ Bldg., San Francisco*

Conveyor catalog

New 36-page catalog on Metzgar conveyors and equipment contains sections on applications, assembly, and service instructions. It describes and illustrates both gravity and power conveyors and combinations of these two. Specifications and technical data are included. 54. *Metzgar Conveyor Co., Dept. W1, 412 Douglas St. N. W., Grand Rapids 4, Mich.*

Custom engineered equipment

"Consolidated Systems Engineering," new 16-page brochure, gives info on company's newly formed systems division, established to meet need for entire systems of data-processing and control equipment. Case histories, applications, key personnel, service facilities, and methods of planning are featured. CEC-1304. *Consolidated Engineering Corp., Pasadena 15, Calif.*

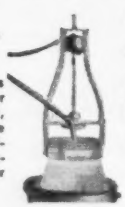
Data on adsorption

Indexed catalog on Linde molecular sieves provides complete data on this group of adsorbent materials which separate substances by molecule size. Index covers general info, physical form, summary of applications, desiccants, hydrocarbon purification, drying of gases and liquids, adsorption as industrial process, and activated carbon. Large catalog also gives numerous charts and technical data. *Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.*

BETTER QUALITY EQUIPMENT for CHEMICAL, PAINT and FOOD INDUSTRIES

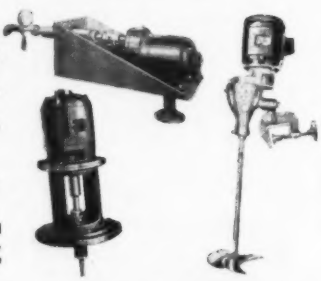
Gyratory Screens

COMBS Gyratory Screens operate at low cost per hour. Compact, sturdy, easy to clean. They are available in many different sizes and capacities for either wet or dry screening.



The Fernholtz line includes quality equipment for all phases of industrial processing. We'll be glad to give you complete information.

Write for free descriptive catalogs



Ball Mills

Successfully operating on all types of production. Feature gear head motor, conical bridge-type construction, self-aligning roller bearings.

FERNHOLTZ MACHINERY CO.

8468-W Melrose Place, Los Angeles 46, Calif.
Webster 8-5145

International Mixers

Complete range of sizes and speeds. Marine-type, gate-type, turbine, shrouded turbines, P-type and X-type propeller blades.

Metal-working presses

Informative booklet, "Deep Drawing Hydraulic Presses for Metal Working," offers complete description of features incorporated in M & N's latest metal working press. Emphasized are operational advantages to be gained from hydraulically controlled operation of this 10- to 600-ton press. Complete specifications are also included. 502-A. *M & N Hydraulic Press Co., 780 Route 3, Clifton, N. J.*

Info on Blaw-Knox

Newly published 50-page brochure, "This Is Blaw-Knox," covers manufacturing activities of this company. Containing illustrated material on all major departmental operations in company's eleven divisions, brochure places emphasis on products and their industrial applications. Included are location and manufacturing facilities of company plants and a complete listing of available catalogs. *Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh 30, Pa.*

"Good Lighting is Good Business"

. . . is a comprehensive, illustrated brochure exploring economics and mechanics of good office lighting. Topics covered include layout and planning, maintenance, room finishes and color, quantity of light, fluorescent vs. incandescent, light distribution, and natural lighting. *Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N. Y.*

New steel process

. . . is graphically described with illustrations, drawings, and charts in new 12-page booklet on oxygen converter process of steel making for which Kaiser now holds U. S. license. Process is fully described and its history traced. Advantages of the finished steel are outlined, and a cost and capacity breakdown given. *Kaiser Engineers, 1924 Broadway, Oakland 12, Calif.*

Appraisal services for food processing

A partial list of food processing plants presently using General Appraisal services is given in this folder. Literature also covers specific advantages derived from appraisal services. *General Appraisal Co., 208 West Eighth St., Los Angeles*

Now, we can serve you faster than ever with our new warehouse in Long Beach, California.

Immediate shipments are made on our complete line of centrifugal pumps for construction, industry and irrigation.

Quick delivery and lower costs make CARVER your No. 1 supplier. *Ask for full information.*

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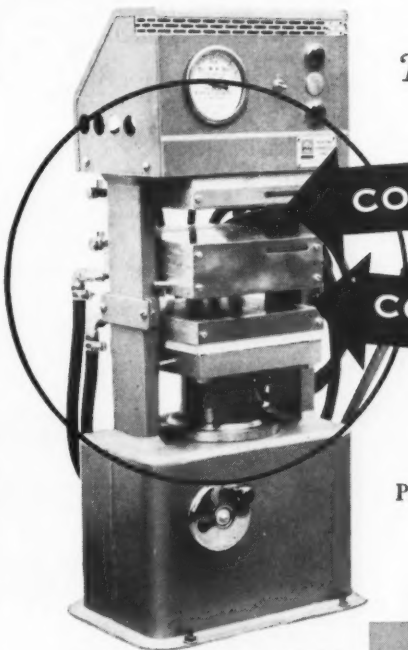
CARVER

CARVER PUMPS
the quality name in pumps



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Laminator Press

CONSTANT HEAT
Triple Production
CONSTANT COLD
No Waiting

Hot platens electrically heated.
Cold platens water cooled.
Platen size:
8" x 8", 8¾" x 12, 12" x 12"
12" x 18", 18" x 18"
Manually or Electrically operated

20 to 60 ton capacity
larger presses built to customers specifications

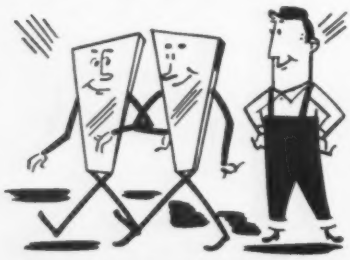
P·H·I
PRESS

PASADENA
HYDRAULICS INC.
279 N. Hill Avenue
Pasadena 4, California

The case of the struggling steel chips...

A Cleveland concern had a really perplexing problem of congested bins. No matter how the steel chips struggled to get through, the result was either a trickle or a complete jam-up.

As luck would have it, one of our men happened along and suggested a CLEVELAND vibrator be installed on the sloping side of the bin. It worked like a charm, and the steel chips struggled no more.



Ever think of a CLEVELAND vibrator for your stubborn materials? Our detailed literature will tell you more about it.

AIR *and* ELECTRIC

Bin Stuck Lately?

THE CLEVELAND VIBRATOR COMPANY

2914 Clinton Avenue • Cleveland 13, Calif.
7 Front Street • San Francisco 11, Calif.

WESTERNERS AT WORK

CALIFORNIA

Alto Scientific Co.

Lester L. Libby becomes associated as full partner in this Palo Alto firm, founded by *Thomas F. Turner*. He was until recently assistant chief engineer of Sierra Electronics Corp.

Beckman & Whitley, Inc.

Donald J. Portman becomes staff physicist with this San Carlos manufacturer of high-speed research cameras, thermal and meteorological instruments, leaving post of staff assistant in micrometereological research at Johns Hopkins University.

Kaiser Aluminum & Chemical Corp.

Richard T. Myer is named chief metallurgist of aluminum fabrication division in Oakland. He was formerly chief metallurgist at Massena Works and, earlier, New Kensington Works of Aluminum Co. of America, and prior to that held similar post at Goodyear Aircraft Corp.

Kaiser Steel Corp.

Harrison H. Hance is appointed manager of advertising and publications for this Kaiser corporation at Oakland, after six years with Kaiser Services, where he last served as assistant to manager, public relations and advertising. Before 1948 he was with Tide Water Associated Oil Co.

Northrop Aircraft, Inc.

C. Hart Miller joins this Hawthorne aircraft manufacturer as executive assistant to Vice President *John W. Myers*. He will be concerned with customer relations division, particularly the Snark B-62 pilotless bomber program. His former post was consultant and director of Prewitt Aircraft Co., Clifton Heights, Pa.

Resin Industries

John Fertig joins this Santa Barbara firm to head quality control of manufacturing. He was recently discharged from U.S. Army and earlier served in Corps of Engineers.

Specification Packaging Engineering Corp.

Robert Salembier, Jr., former general manager of this Burbank firm, is elevated to position of president, succeeding *David T. Lane*, who has resigned to look after his business interests in Texas.

Southern Pacific Co.

W. J. McHugh is appointed master mechanic of Los Angeles Division. He is succeeded as superintendent of general shops by *Drisdale Brown*.

General Metals Corp.

B. A. Robbins *R. E. Kroeck*
Enterprise Division
General Metals Corp.

Robert H. Williams joins this San Francisco company as industrial relations director. *John H. Scheusner* is named manager of operations for General Metals' Enterprise Division, to take charge of engine research, development, and engineering, and all phases of manufacturing. He has been with this division since 1945. Two further appointments in Enterprise Division are *R. E. Kroeck* as manager of manufacturing and *B. A. Robbins* as manager of engineering. Mr. Kroeck has been with company for thirty years, and last held post of manager of production control and purchasing. Mr. Robbins joined company in 1947 and prior to new assignment was chief products development engineer.

A. Brown is named controller for Adel Division of General Metals at Burbank. He was formerly controller for San Diego plant of Solar Aircraft Co.

J. F. Pritchard Co. of Calif.

Karl E. Johnson is promoted to vice president and general manager.

Western Insulated Wire Co.

George Hunsinger is named engineer of wires and cables for this Los Angeles manufacturer of Bronco electrical cords and cables.

Pacific Clay Products

A. Lee Bennett is appointed research director of this Los Angeles company, to manage research laboratory, quality control activities, and technical service. Prior to joining company, he was associated with Gladding, McBean & Co. for over 30 years, most recently as vice president in charge of research and development.

COLORADO

Eaton Metal Products Co.

Thomas B. Breen is new general manager of this company, with headquarters at Denver home office. He was formerly plant manager at Billings, Mont., and is succeeded there by *Thomas R. Lux*, former manager of Albuquerque, N. M., plant. *W. C. Dale*, assistant manager at Billings, moves to Albuquerque as manager.

OREGON

Smith Canning and Freezing Co. of Oregon

Milan D. Smith, general manager of this Pendleton concern and also of Smith Frozen Foods of Oregon and Idaho, becomes executive assistant to Secretary of Agriculture Ezra Taft Benson.

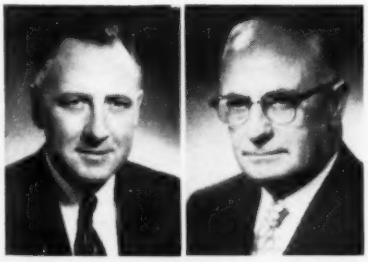
Willamette Iron and Steel Corp.

C. Lloyd Thorpe
Willamette Iron & Steel Corp.

C. Lloyd Thorpe, new general manager of this Portland firm, comes from Guy F. Atkinson Co., South San Francisco, Calif., where he has been personnel and public relations manager the last six years. He also was consulting technical editor for WESTERN INDUSTRY for the same period. Previous experience was in the manufacturing field, with Dalmo Victor and other companies.

UTAH

U. S. Steel Corp.



R. M. von Storch *F. V. Hicks*
Columbia-Geneva Steel

Robert M. von Storch is appointed superintendent—coal mines and quarries of Columbia-Geneva Steel Division, succeeding *Frank V. Hicks*, who retired recently. Mr. Hicks was superintendent of Geneva and Columbia mines when they began production during the war and held post of general superintendent of mines and quarries after 1946. Mr. Storch moves up from position of superintendent of Columbia mine, where he is replaced by *James Cassano*, former supervisor of industrial relations for mines and quarries.

WASHINGTON

Seattle Gas Co.

Walter Byrne of Omaha, Neb., will succeed *N. Henry Gellert* as president of this Washington utility next March, when Mr. Gellert plans to return to his former activity as a management consultant. Mr. Byrne has been general manager of Omaha Metropolitan Utilities District. *Charles M. Sturkey* will continue as general manager, with new title of executive vice president.

Nathan H. Gellert, Jr., is appointed coordinator of natural gas conversion, and will be assisted by *David D. Risser*. *James F. Gary* heads new department as superintendent of engineering, succeeded as superintendent of distribution by *Vernon H. Damm*.

Simpson Logging Co.

H. P. Puhn, former general operations manager of this Shelton company, becomes land and timber manager, in charge of logging, log purchasing and distribution, logging planning, forestry and tree farm program. He has been with company since 1927, and was named general manager in 1951. *H. W. McClary*, former general manager of Anacortes Veneer, Inc., is new manager of lumber and plywood products for Simpson.

Carborundum Co.

Elmer E. Howard is placed at head of this company's Vancouver plant and *John L. Bergman*, former manager, returns to Niagara Falls, N. Y., as works engineer in manufacturing division. Mr. Howard, who has been with company since 1937, last held post of supervising process engineer of bonded products and grain division.

Book values are not insurable values

● Reliance on book values for fire insurance coverage is misleading and dangerous.

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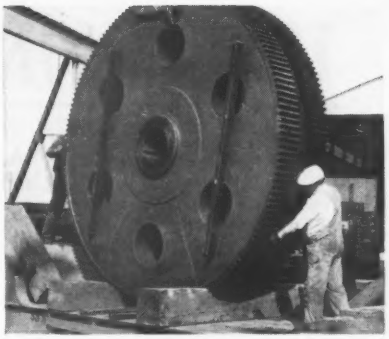
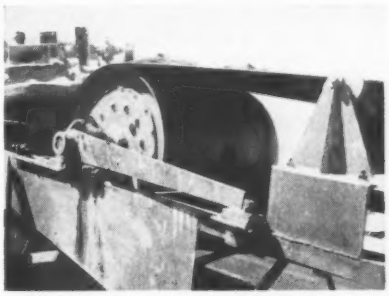
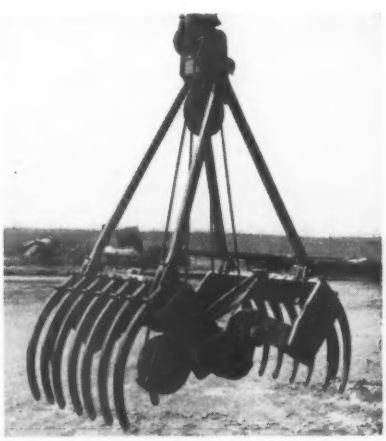
OFFICES IN PRINCIPAL CITIES



YUBABILT BULL GEARS with 12" face and outside diameter of 146", for main drive gears on bucket line of bucket ladder dredge. Welded construction saved cost of new patterns.



YUBA-SCHROCK MOTORIZED HEAD PULLEY has motor mounted internally, eliminates all external gears, sprockets, chains, saves space, operates safely under wet, dusty, gritty conditions. ½ to 125 hp.



STOCKTON-YUBABILT TINE FORK for handling kelp, steel shavings, etc., has same powerful closing action as Yubabilt Power Arm Clamshell.

For special equipment, designed and built to your order, consult YUBA.

77

YUBA DREDGES — PROVED DEPENDABILITY AROUND THE WORLD

YUBA MANUFACTURING CO.

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TRADE WINDS

Disston & Sons warehouse in L.A.

New warehouse and office open in Los Angeles for Henry Disston & Sons, Inc., Philadelphia manufacturer of saws, tools, and alloy steels. New operation is under supervision of Harold Spurgeon, who has represented company for many years in this territory.

To manage Pacific Coast sales

James M. Bell is named Pacific Coast sales manager for Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y. He has been a member of company's Pacific Coast sales staff since 1952, and earlier was vice president in charge of sales in Southern California and Arizona for E. J. Bradley Co. He now replaces Theodore I. Dunn, Jr., recently named assistant vice president for Eastern sales of RB&W.

"Bowserama"

Starting at Seattle on January 17, top officials of Bowser, Inc., will escort a special exhibition of company's major products on a tour of the West. Schedule calls for stops at San Francisco (January 24-26), Los Angeles (January 31-February 2), and Salt Lake City (February 15). From this city the exhibit will swing through the Southwest. Show consists of working models of Bowser products, plus motion pictures, slides, and engineering conferences.

Promotion for Banis

McCulloch Motors Corp., Los Angeles, appoints Joe Banis as manager of district representatives, with headquarters at company's main office. Mr. Banis was formerly Midwestern district representative.

New line for Montague-Harris

Montague-Harris and Co., Los Angeles, is appointed exclusive sales representative in Southern California, Arizona, and Southern Nevada for Almco metal finishing line manufactured by Almco Division, Queen Stove Works, Albert Lea, Minn. Shown here completing sales agreement (l. to r.): Ray Krieger, Don Montague, Dick Johnson, all of Montague-Harris, and Robert Trow, vice president and general manager of Almco. Company will offer line of machinery, equipment, and compounds for barrel finishing of metal parts.

Executives complete sales agreement

Lafferty in own business

J. W. Lafferty Co. is set up in Los Angeles to represent Ira G. Perin Co. in Southern California and Arizona, headed by J. W. Lafferty, Perin's manager in this area for past seven years. San Francisco office of Perin continues its present operations, service, and stock of parts for Northern California, Nevada, and Hawaii.

J. W. Lafferty
J. W. Lafferty Co.

T. R. Carrell
Parker Appliance Co.

Carrell joins Parker Appliance

Ted R. Carrell is appointed Parker o-ring sales engineer for Pacific Coast territory of Parker Appliance Co., with offices at company's rubber products division in Los Angeles. His new duties include cooperative work with Parker o-ring distributors, under direction of rubber products sales manager at company's headquarters in Cleveland, O. Mr. Carrell was formerly associated with E. B. Wiggins.

Strasmann expands service

F. W. Strasmann Co., Belmont, Calif., takes over Barber Colman line of gear hobbers and cutting tools, and installs equipment for sharpening hobs and reamers for precision work.

New Truarc distributor

Waldes Kohinoor, Inc., of Long Island City, N. Y., appoints Bearing Engineering Co. of San Francisco and Oakland as exclusive distributor for Waldes Truarc products, to serve Northern California manufacturers. Company will stock Truarc retaining rings, grooving tools, pliers, applicators, and dispensers.

Open computer center

J. B. Rea Co. puts into service new analog computation center at its Los Angeles plant, available to industrial and military users to solve problems in field of engineering research, development, design, and simulation. Equipment was manufactured by Electronic Assocs., Inc. Rea Co. for the past year has also offered an IBM CPC digital computer service.

Hathaway joins Oronite

Norman E. Hathaway is appointed Western sales manager for Oronite Chemical Co., subsidiary of Standard Oil Co. of Calif., with offices in San Francisco. He was previously director of Chemical and Rubber Division, Business and Defense Services Admin., Department of Commerce, in Washington, D. C., and general sales manager of industrial chemicals for Davison Chemical Co. Oronite's Western sales area includes the Far West, Western Canada, and the Hawaiian Islands.

Paint lab in service

Resin Division of National Starch Products Inc. sets up new paint laboratory at Arcadia, Calif., to serve paint companies in Southern California who use National's polyvinyl acetate. Laboratory is headed by Harry A. King, who recently returned to company from military service with Chemical Corps.

Hamerslag adds caster line

Hamerslag Equipment Co., San Francisco, is appointed a distributor of casters for furniture, institutional use, and industrial trucks by The Bassick Co., a division of Stewart Warner Corp.

Five new dealers for Petley-Berger

Petley Incorporated of Los Angeles, which represents Berger Manufacturing Division of Republic Steel Corp., appoints five firms in Southwest and Southern California to handle its line of fixtures and equipment. School and Sports Supply Co., which has offices in Phoenix and Tucson, will serve Arizona. Sarrett Office and Equipment Co., Las Vegas, and J. R. Bradley Co., Reno, will cover Nevada. Industrial Office and Equipment Co. of San Diego will serve that part of California. Kern County representative will be Bakersfield Hardware Co. Petley carries filing cases, shelves and bins for parts storage, desks, toolroom equipment, work benches, etc., and has recently added Republic Steel Corp.'s line of material handling equipment.

Timken man moves West

Paul Garmus is transferred to Los Angeles office of Timken Roller Bearing Co., to take charge of sale of graphitic tool steels on West Coast. He moves from company's Detroit office, where he held a similar post. Since joining Timken in 1935, Mr. Garmus has worked in steel mill research department, mill metallurgical department, metallurgical investigations department, and as field engineer.

Bixby heads agricultural chemicals

Pennsylvania Salt Manufacturing Co. of Washington, Tacoma, Wash., names Arthur F. Bixby as manager of agricultural chemicals, a promotion from position of assistant manager which he has held since last July. Joseph C. Neighbors becomes district sales manager of the Los Angeles office of Pennsalt.

A. F. Bixby
Pennsylvania Salt Mfg. Co.

Kenneth Archer
Soulé Steel Co.

Soule in Salt Lake City

Kenneth Archer is named manager of Soulé Steel Co. sales office in Salt Lake City, which has been set up to give estimates and engineering help on steel and aluminum building products. Mr. Archer, who was formerly at Soulé's Los Angeles plant as a sales engineer, will work closely with Associated Specialties Co., Salt Lake City distributor.

Calkins heads Denver office

Fluor Corp., Ltd., of Los Angeles opens new district sales office in Denver, under the management of L. O. Calkins, who was formerly manager of project coordination at company's home office. William Bowles is new district sales engineer, transferring from Fluor's Houston, Tex., sales office. Denver office, which serves Colorado, Utah, Montana, Wyoming, New Mexico, and southeast Idaho, is under the direct supervision of George H. Dieter, vice president, Western area sales.

Pettler moves to Seattle

Eugene D. Pettler is named resident field engineer in charge of newly formed Seattle district office of CEC Instruments, Inc., sales and service subsidiary of Consolidated Engineering Corp., Pasadena, Calif. He joined company in August 1953 as field engineer in Western regional headquarters. Prior to that he served as an engineer with Navy laboratory at Port Hueneme, Calif. Newly established office at Seattle will serve customers in Washington, Oregon, Idaho, Wyoming, and Montana, as well as the three Western Canadian provinces.

Ryerson reassignments

C. D. D'Amico *F. X. Kinzie*
Joseph T. Ryerson & Son, Inc.

Joseph T. Ryerson & Son, Inc., appoints C. D. D'Amico manager of sales to succeed C. H. Hallett, who moves to Ryerson's Chicago plant for special assignment. F. X. Kinzie is new manager of stainless steel department, the post vacated by Mr. D'Amico. Mr. Kinzie joined Ryerson at Chicago in 1937 and transferred to Los Angeles in 1946. Mr. D'Amico, formerly a metallurgical engineer, became associated with company's Los Angeles plant in 1947 as manager of special steels department.

Bralco opens office-warehouse

New 25,000-sq. ft. office and warehouse for Bralco Metals, Inc., begins operations at 6489 Corvette St., Los Angeles. Company is distributor of a variety of non-ferrous mill products, including aluminum sheet, wire, rod and bar, tubing, structural and architectural shapes; brass rods; aluminum silicon and manganese bronze; and other metals. President and founder of firm is Claude Cohn.

Ridgway in new post

Whitman Ridgway is appointed manager of electric utility sales in San Francisco region for General Electric Co., succeeding Marion S. Barnes, deceased. Mr. Ridgway was formerly San Francisco coordinator of electric utilities sales activities and was active in recruiting university graduates for G-E's manpower development program. He has been with company since 1940, except for war service.

Alden moves to Gardena

Alden Equipment Co. moves from Los Angeles to larger quarters at 1449 West Rosecrans Ave., Gardena, Calif. Company handles products of Mechanical Handling Systems, Inc., Louden Machinery Co., Jeffrey Manufacturing Co., Cleveland Worm and Gear Co., and Farval Corp.

New West Coast service

Balas Collet Co. of Cleveland, O., picks two distributors in California to stock its pad pushers, feed fingers, and other screw machine accessories. A. C. Behringer, Inc., Los Angeles, and Paul and Dudley, Glendale, will handle these products in Southern California. Stocks will also be made available in San Francisco area.

Open Los Angeles branch

Harris-Seybold Co. opens new branch office in Los Angeles to serve its Southern Pacific district, headed by N. M. Spencer, service manager. Company manufactures rotary presses and power cutters.

Acoustical engineers open shop

D. Gerald Barr Co. begins operations in Oakland, specializing in acoustical engineering and contracting and distributing of acoustical products. Organizers of new company are Jerry Barr and George Carrieres.

Totrust paint for Southland

Degen-Fiege Co. of Los Angeles is named Southern California distribtor of Totrust metal coat and enamel, manufactured by Wilbur and Williams Co. of Boston, Mass. Factory representative, Henry Wagner, will work closely with Degen-Fiege on a full-time basis to assist industrial firms with their painting problems.

Sterling sales manager

John R. Howell is named sales manager and director of Sterling Electric Motors, Inc., Los Angeles, to supervise 24 district offices and over 400 distributors and service representatives. He has been with company for over 25 years. Sterling manufactures integral horsepower electric motor drives and a line of geared motors, variable speed transmissions, and geared reducers.

Add stainless steel line

Cold Metal Products Co. of California, Los Angeles, is appointed a distributor of stainless steel sheets, strip, and plates manufactured by Armco Steel Corp. of Middletown, Ohio. Among new stocks carried will be special Armco military specification grades. Product manager of CMP's stainless steel division is P. W. Messer.

Riggins returns to West

Edward E. Riggins transfers from Chicago general sales office of Chicago Bridge & Iron Co. to Los Angeles sales office. He has been with company since September 1950, and worked at its Birmingham and Salt Lake City plants until June of last year, when he was transferred to Chicago.

Rucker picks Miller

Lynn T. Miller is named to head new office and warehouse in Portland, Ore., established by The Rucker Co. of Oakland, Calif. He is a newcomer to the firm, who was last associated with Bonneville Power Admin. as a mechanical engineer in Portland-Vancouver area. Rucker Co. designs, builds, and distributes fluid power systems.

There's a *Big* difference in steel buildings...

Butler clear-span rigid frames are stress-engineered and load-tested to safely support conveyors, monorails, etc.

take BUTLER pre-engineered rigid frames for instance...

Strength to spare—plus full use of space from wall to roof ridge. These are important advantages Butler's rigid frame construction gives you. Post-free spans up to 70 feet need no truss supports. Every cubic foot is usable! Butler's rigid frame supports hoists and monorails, yet has reserve strength for future changes affecting building load. Pre-engineered to give you maximum strength without a pound of excess steel. This is just ONE feature that makes Butler buildings your best buy... priced at the lowest figure you can afford to pay for a *quality* building. Get the full story... mail coupon today.

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IN THIS SPACE
ONLY $7.50

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BARGAIN

McKay Leveler — Slightly Used

4¼" x 54" x 9 Roll — Max. Capacity .160 ga. x 48"

Speed 80 to 320 F.P.M.

Complete with

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40,000 Sq. Ft. on Spur Track
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3½ Acres—Will Lease for
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Located at Gonzales

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$882,000 acquisition cost of Construction, Industrial Shop, Office Equipment, and Supplies of

BUY RITE TRUCK & EQUIPMENT, INC.

(Complete Liquidation of Their Oakland Yard)

911 Ferry Street, Oakland, Calif.

to be sold to the high bidder in lots to suit on
THURSDAY, JANUARY 20, starting at 10:00 A.M.

Comprising in part—

2 N.W. 80D Cranes, 2 N.W. 6 Combination Cranes, Bucyrus Erie 37B Crane, Link Belt Speeder Model MS70 Cruiser Crane on Maxi, Caterpillar No. 12 Motor Grader, $154,000 cost New Cat., Murphy, & G.M.C. Parts, Rock Crushers, Air Compressors, Diesel Engines, 15 Ton Athey Tracks, Shop and Office Equipment, etc. etc.

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THE West ON ITS WAY

NEW PLANTS, EXPANSIONS, NEW INDUSTRIES, PRODUCTION CONTRACTS, DEVELOPMENT PROJECTS, UTILIZATION OF RESOURCES

CALIFORNIA

MILLION DOLLAR EXPANSION—Union Oil Co. plans to add four new structures to the 14 existing buildings at its Brea research center, providing facilities for large-scale experimental units, pilot plants, and additional laboratories, at a cost of $1,000,000.

ELECTRONICS PLANT UNDER WAY Servomechanisms, Inc., which now occupies five buildings in El Segundo, will consolidate operations next spring in new plant now under construction at Los Angeles International Airport. Building, which will cover 48,000 sq. ft. and employ about 500 persons, will cost approximately $500,000. Company, with divisions also in East and a Canadian subsidiary, designs and produces control systems, computers, and instruments.

WHITTIER ADDITION — Accessory Products Corp. opens new $65,000 addition to Whittier plant for manufacture and testing of aircraft products.

SYNTHETIC RUBBER PLANTS—Shell Chemical Corp. enters agreement with U. S. Government for purchase of three government synthetic rubber plants in Los Angeles area: one now operated by Shell, another operated by Midland Rubber Corp., and a third run by Dow Chemical Corp. Food Machinery and Chemical Corp., San Jose, also signs purchase contract with government to acquire synthetic rubber plant at Houston, Tex. FMC's plans call for joint ownership and operation of plant with Tennessee Gas Transmission Co.

ROTORCYCLE — Hiller Helicopters, Palo Alto, receives $200,000 Navy contract for research and development of one-man portable helicopter, to be completed within one year.

ORDNANCE CONTRACT—A $1,913,856 contract is awarded Food Machinery and Chemical Corp., San Jose, for manufacture of missile body shipping containers for armed forces.

HOFFMAN STEPS IN—Stewart-Warner Corp., Chicago, which is leaving television field, makes available to Hoffman Electronics Corp. (formerly Hoffman Radio Corp.), Los Angeles, its tools, dies, and other manufacturing equipment, and turns over to that company its service warranties, parts inventories, and majority of its television distributors.

TO START WORK NEXT MONTH—Manufacture of electric aircraft motors will begin in February in new plant of U. S. Electrical Motors, Inc., located along Santa Ana freeway, Los Angeles. Plant has main building covering 108,000 sq. ft. and auxiliary 18,000 sq. ft. building for rotor processing and casting operations. Company operates two other plants in Los Angeles.

FRIDEN ADDS—A 19,200-sq. ft. addition to a building completed earlier this year is under construction at San Leandro plant of Friden Calculating Machine Co.

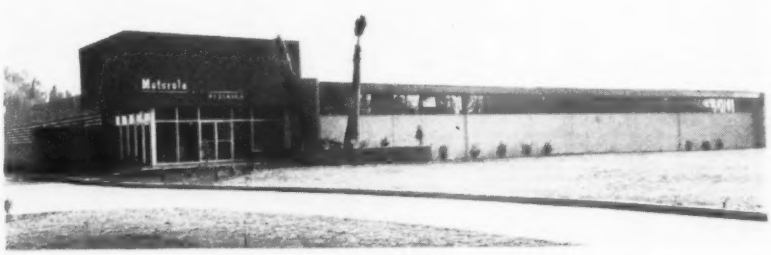
ARGENTINE CONTRACT—Southwestern Engineering Co., Los Angeles, is awarded contract for engineering and construction of mining project for National Lead Co., S.A., in Argentina, to cover lead, zinc, and copper concentrator, power plant, pipeline, and housing for personnel.

MERGER—Preco Incorporated, Los Angeles, acquires in stock transfer Electra Motors, Inc., and California Gear Co., both of Anaheim. Electra manufactures industrial electric motors for which California Gear, formerly its subsidiary, supplies component gears. Two companies will continue under present management.

PICK STOCKTON—California Walnut Growers Assoc. will build $1,500,000 walnut cracking plant in Stockton in time for handling 1955 crop—first step in transfer of headquarters from Los Angeles. Plant will employ 80 to 100 full-time office and warehouse workers, with seasonal peak of 600 to 800 workers. Anticipated long-term investment in walnut processing facilities will be about $7,000,000, employing 1,500 persons.

TO BUILD IN SAN FRANCISCO—S&W Fine Foods, Inc., will start construction of its plant and international headquarters in February on a 10-acre site located on San Francisco-San Mateo county line. The $2,000,000 plant will be completed by spring of 1956.

NEW NAME—Simpson Logging Co.'s Redwood Division, with operations at Arcata and Klamath, is reorganized as Simpson Redwood Co.



MOTOROLA RESEARCH LAB—Motorola Inc. dedicates its new Riverside research laboratory for research and development in field of guided missiles and other ordnance devices. Facility will employ about 200 people.

A section of the January 1955 issue of WESTERN INDUSTRY — 609 Mission Street, San Francisco 5, Calif.

KICK-OFF FOR NEW PLANT—Construction of new building for Cleveland Crane & Engineering Co. gets under way in Los Angeles. Here, from left to right: Edgar A. Griswold, building contractor; C. H. Saiter, sales manager of Cleveland Crane; H. T. Florence, exec. vice president and general manager; Fred Everard, Western district manager of Cleveland Tramrail; and P. H. Bertola, president of General Conveyor, Inc., which will also occupy building.

KAY LAB EXPANDING—Sketch of new plant for production of television equipment and electronics-type precision instruments which will be built by Kay Lab in San Diego. Construction will require preliminary investment of $150,000. The 150 x 200 ft. building will be located about eight miles from San Diego business center in industrial tract now being developed to attract other companies in field of electronics in San Diego area.

BUY SEELE—Seele Punch Press Division of Pacific Tool and Die Co. of Los Angeles is acquired by Paul Ward Brody, who will organize Intercontinental Machine Corp. to continue manufacture of punch presses, with branch outlets in Berlin, Germany, and Buenos Aires, Argentina.

PORCELAIN PROGRESS — California Metal Enameling Co., Los Angeles, acquires manufacturing facilities of Seaporcel Pacific, Inc., Los Angeles, for manufacture of architectural porcelain enameled products. Purchased company is subsidiary of Seaporcel Metals, Inc.

CHEMICALS FIRM—Wood Treating Chemicals Co. of St. Louis takes 10-year lease on former Texas Co. plant in Oakland for manufacture of wood preservatives and agricultural chemicals. This is company's first West Coast plant.

SHIP CONVERSION JOB — Western Gear Works, Lynwood, receives its second contract for manufacture of submarine cable laying machinery to convert U. S. naval vessel to cable laying ship.

BACON METAL PRODUCTS — New manufacturer of materials handling equipment, Bacon Metal Products Co., is producing Hercules line of steel platform trucks and hand trucks at plant in Montebello, Los Angeles area.

FORM NEW FIRMS—Silver Line Brake Lining Corp. acquires United States Spring and Bumper Co.'s Brake Division, including manufacturing plant at Santa Clara; and Chainveyor Division of United States Spring and Bumper is sold to newly formed Chainveyor Corp. New corporations consist of former staff and operating personnel of operating divisions, and both are headed by Patrick T. Rauen, former vice president of company. Sales and distribution policies will continue without change.

IN SERVICE—New 28,000 sq. ft. engineering and research building is occupied by weapon systems division of Radioplane Co., Van Nuys subsidiary of Northrop Aircraft, Inc.

MORE SPACE FOR KAJON—Kajon Manufacturing Co. of El Segundo, producer of holding clamps, moves to new and larger building at 107 North Eucalyptus Dr.

BUY FULLERTON OIL—Monterey Oil Co. acquires in $50,000,000 cash purchase all oil and gas properties, plant interests, and assets of Fullerton Oil and Gas Corp.

BRAIN WORK — Ramo-Wooldridge Corp. of Los Angeles contracts with Westinghouse Electric Corp. to carry out $1,000,000 program for developing airborne light-weight computer equipment adapting "giant brains" to use in high-speed aircraft and guided missiles. Program is financed by Westinghouse.

SPRAGUE HEADQUARTERS — Sprague Electric Co. of North Adams, Mass., is building new 13,000-sq. ft. plant in Venice to house manufacturing operations and distributor division, Sprague Products Co. Company will make electronic and electrical items especially for aircraft industry.

BROADER VISTA — Vista Furniture Co., Anaheim, acquires an affiliate through purchase of Costa Mesa Furniture, Costa Mesa manufacturer of modern office furniture.

CONTRACT FOR CONTAINERS — American Pipe and Steel Corp., Alhambra, is awarded contract for manufacture of steel storage and shipping containers by Firestone Tire and Rubber Co., to be used in guided missile program.

LEAR BUYS PRODUCT—Lear, Inc., Los Angeles, acquires design and manufacturing rights to servo systems and components developed by Auto-Control Laboratories, Alhambra.

PEANUT BUTTER PURCHASE—Best Foods, Inc., New York, plans to buy Rosefield Packing Co., Alameda, producer and distributor of peanut butter, with plants also in Midwest and East.

HAWAIIAN REFINERY—Standard Oil Co. of California will build complete modern oil refinery in Honolulu in near future, at an estimated cost of over $25,000,000.

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COLORADO

M-H CLASS—Denver chapter of American Material Handling Society will sponsor 8-week materials handling course, beginning in February, to be conducted by Colorado University Extension School and led by Charles Schoenecke. Enrollment fee is $10.

NEW PRODUCT FOR SHWAYDER—Shwayder Bros., Inc., of Denver begins production of new line of luggage manufactured from magnesium, with tradename "Ultralite Samsonite." Company plans to use about one quarter of its plant capacity for magnesium line, which was developed with help of Dow Chemical Co.

RIO GRANDE PLANS—Denver and Rio Grande Western Railroad plans $7,600,000 improvement program for 1955, covering $3,300,000 purchase of 18 diesel-electric locomotives, $1,000,000 investment in new freight cars, a further $1,000,000 expenditure for new rails, and $755,000 in improvements to shop and other facilities. Yards at Ogden, and Provo, Utah, will be expanded to handle increased traffic.

LIME FROM MARBLE—Basic Chemical Corp. is formed in Glenwood Springs to produce lime from marble rock taken from quarries at Marble, Colo. Rock will be crushed at Marble and shipped to Glenwood Springs for processing.

EXPAND URANIUM PLANT—Vanadium Corp. of America agrees in contract with Atomic Energy Commission to increase capacity of VCA's uranium ore processing plant at Naturita. Added facilities will be in operation in early 1955.

CONTROL SYSTEM FOR CF&I—Colorado Fuel and Iron Corp., Pueblo, will modernize its steel ingot soaking pits through addition of automatic control equipment to regulate temperatures and pressures and record the flow of gas used as fuel. Engineering and installation of equipment will be done by Minneapolis-Honeywell.

IDAHO

SIMPLOT EXPANDS—J. R. Simplot Co. fertilizer plant at Pocatello expands production capacity to design output of over 100,000 tons of high analysis fertilizer annually. Company also plans to add ore-calcining operation

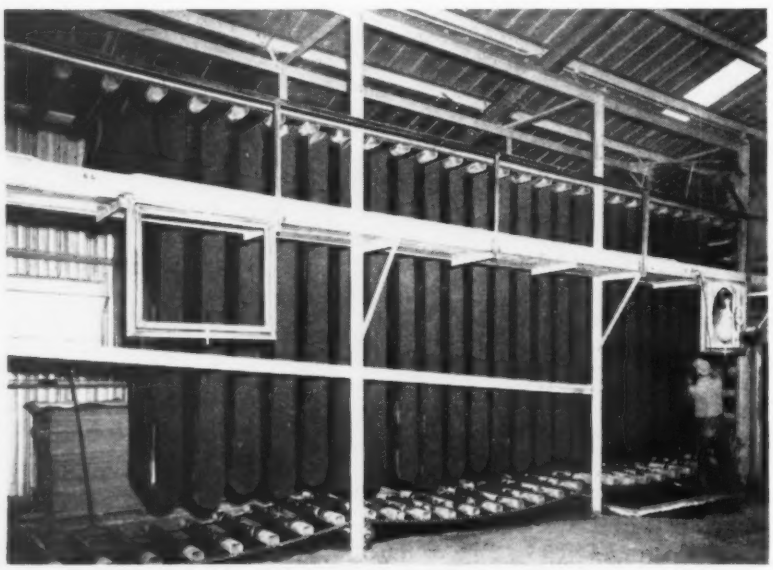
PUMICE PROJECT — New company, Pumice Inc., with offices at Idaho Falls, is building pumice processing plant at Ammon.

APPRAISAL FIRMS MERGE—Western Appraisal Co., Boise, is acquired by General Appraisal Co. of Seattle and Portland, to be operated as a branch with no changes in personnel.

MONTANA

FREIGHT TERMINAL — Consolidated Freightways will complete new $300,000 terminal in Billings by next summer. Construction is now in progress by J. C. Mitchell Construction Co., Billings.

GANG SAW AT WORK — Elkhorn Lumber Co., Missoula, which recently purchased and moved into Fogarty Bros. sawmill, begins operations with newly installed sash gang saw imported from Germany. Full capacity of gang saw is 50,000 ft. per shift.



MANUFACTURE ROOFING—Marvel Roofing Products, Inc., Albuquerque, which began operations with a small felt mill in 1950, is now producing a full line of composition rolled roofing and shingles from kraft and cardboard carton waste. Shown here is felt saturation and coating process. J. Frank Cox is executive vice president and general manager of the company, which employs about 85 persons.

NEVADA

NEW MANGANESE PLANT—Nevada Ore Refining Corp. of Nevada starts production of manganese sulfate at its Reno Hot Springs plant. Company plans to produce all types of manganese chemicals, with a capacity of 50 tons of ore daily, and will employ over 30 people on three shifts.

TO REOPEN MILL—Bruhi Enterprises will reportedly enlarge its Mohawk mill near Silver Peak and resume operations in both mill and mine, employing a crew of about 60, in near future. W. Church Holmes will be general manager of operation.

NEW TUNGSTEN MILL? — Strachan Machinery Co. of San Francisco is reported to be considering construction of a tungsten mill at Delleker, to handle ore from its property near Portola and other mines in area.

LOVELOCK MILL AT WORK—Gypsum mill in Lovelock owned by E. M. Roach begins production and plans to employ full crew of 20 men per shift. Owner is reported to be planning new mill outside Lovelock for future expansion of operation.

RENO GAS PLANT—Work begins on construction of new gas plant in Reno for Sierra Pacific Power Co. The $500,000 facility will be completed by fall.

SHIPPING TUNGSTEN—New tungsten mill east of Fallon begins operations, shipping concentrates to Vanadium Corp. plant at Bishop, Calif. Owners of mill and mine are John Olson and Fred Bennett, both of California.

NEW MEXICO

COAL FOR CHEMICALS—New interest in coal mines of Madrid, N. M., by a company which would supply anthracite to chemical firms is reported by Oscar Huber, president of Albuquerque and Cerrillos Coal Co. Coal output, which had supplied Los Alamos fuel needs until supplanted by natural gas, is now limited to production of coal for treating lime at Arizona copper plants.

JOINT POTASH VENTURE — Construction of $15,000,000 potash plant will start early in year at site between Carlsbad and Hobbs by Freeport Sulphur Co. of New York and Pittsburgh Consolidation Coal Co. of Pittsburgh. Plant, which will be completed in about two years, will produce 240,000 tons annually of commercial potash.

BACK MICA VENTURE—Petaca Mining Corp., operated by Brothers of Christian Schools, a Catholic teaching order, begins building $300,000 mica mill near Santa Fe. Capacity of mill will be 300 tons of mica ore daily, with output of 60 to 75 tons of mica concentrate when full production begins next year. Southwestern Engineering Co., Los Angeles, will perform actual construction. Profits to the Christian Brothers Order, which holds 55% interest, will go toward endowing St. Michael's College at Santa Fe.

OREGON

HOE BUILDS PLANT—R. Hoe & Co., Inc., starts construction of 30,000-sq. ft. saw manufacturing plant in Portland, to be completed in March, which will double capacity of present factory. Company also operates saw factories in New York and Birmingham, Ala.

NEW COMPANY BUILDS—Zidell Machinery and Supply Co. of Portland in association with Clyde Tube Forgings Ltd. of Glasgow, Scotland, forms $1,000,000 corporation named Clyde Tube Forgings of America, which will build Portland plant for production of pipe welding fittings. Ziddell has been a distributor for Scottish company for past three years. Plant is expected to be in production by mid-year and will employ 200 people in full operation.

M&M ADDS PLASTIC PIPE—M and M Wood Working Co.'s National Tank and Pipe Division is building an addition to its Portland plant for production of plastic pipe. Operations will begin about March 15. Output will include flexible, semi-flexible, and rigid pipe manufactured from a variety of plastics, in dimensions from 8-in. diameter to ½ in.

CEMENT MERGER—Ideal Cement Co. of Denver and Superior Portland Cement, Inc., of Seattle plan merger through exchange of stock. Annual sales of two companies, merged under Ideal firm name, would exceed $60,000,000.

BUILDING PAPER MILL — Western Kraft Corp. plans several million dollar kraft paper plant with capacity of 100 tons per day, to be built at Albany for completion by December 1955.

MAY BUILD PULP PLANT—Longview Fibre Co. options 70-acre site north of Springfield for proposed plant to manufacture corrugated medium for container board.

BUY HEPPNER—Dant and Russell, Inc., Portland, and Morris Hitchcock, White Swan, Wash., buy Heppner Lumber Co. mill at Heppner, together with its pine and fir holdings. Mill will continue in operation with no change in management at present. Full ownership of Heppner Lumber Co.'s planer and remanufacturing plant at Elgin is acquired by P. W. Mahoney and Orville Smith, former part owners.

UTAH

REJECT SALT PLAN — Utah State Land Board refuses application of Chemical Salt Production Co. to establish salt pan and processing plant on Great Salt Lake. Company, a joint affiliate of Pennsylvania Salt Co. and Hooker Electrochemical Co., planned to ship salt to Tacoma, Wash., area for production of chlorine and caustic soda.

TUNGSTEN PROJECT — Consolidated Uranium Co. leases a total of 12 tungsten mining claims in Clifton Mining District of Tooele County and will spend about $300,000 in work on properties and mill construction.

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UTILITIES FOR MOAB—Utah Power and Light Co. is reportedly planning high voltage transmission lines to Moab and Monticello, centers of uranium mining activity, in a $2,000,000 construction program. Mountain States Telephone and Telegraph Co. will carry out $250,000 expansion of facilities in cooperation with Midland Telephone Co. of Moab and Monticello.

POTASH FIRM EXPANDS — Bonneville, Ltd., potash producer near Wendover, plans to build new storage and shipping facilities, and relocate its dryer and sampler, at a cost of $300,000 in next two years.

NEW ROOFING PLANT—Empire Tile Co. builds $150,000 plant in Salt Lake City for manufacture of roofing tile. President of new firm is Kingsley E. Clawson, former head of Rubberoid Co., Salt Lake City.

WASHINGTON

PROGRESS REPORT—Construction of new high-speed cold rolling mill at Kaiser Aluminum and Chemical Corp.'s Trentwood plant will be completed about March 1955. Planned 60-in. four-high rolling mill will add 36,000,000 lb. of light-gage aluminum sheet capacity annually.

BUY SNOW CROP—Minute Maid Corporation, New York, acquires Snow Crop Division of Clinton Foods, with fruit and vegetable freezer plants at Lynden and Kent, Wash., and Lewiston, Ida.

NEW PLANTS AT LONGVIEW—Weyerhaeuser Timber Co. plans two new ventures at Longview: a chemical plant for production of chlorine and caustic soda to supply pulp mill operations; and a paper mill, owned and operated jointly with Rhinelander Paper Co. of Rhinelander, Wisc., to produce glassine, greaseproof paper for food packaging. Both plants will go into production sometime in 1956.

BOEING BULLETINS—Boeing Airplane Co. asks for bids on 20,000-sq. ft. addition to its jig erection building at firm's Plant 2 in Seattle. Company also announces that production flight testing of B-52 heavy jet bombers will get under way at its Moses Lake center about mid-1955, employing around 800 persons.

WYOMING

REYNOLDS SEEKS SITE — Reynolds Mining Corp., a subsidiary of Reynolds Metals Co., is reported to be investigating Lake DeSmet area near Buffalo as possible site for power plant and aluminum reduction plant to be operated by parent company.

FORK RIVER APPLICATION—Washington Water Power Co., Spokane, applies to Federal Power Commission for license to construct dam and power house on Fork River in Montana. Project, which has estimated cost of $87,350,000 would be located in region of Sand Point, Ida., and Thompson Falls, Mont.

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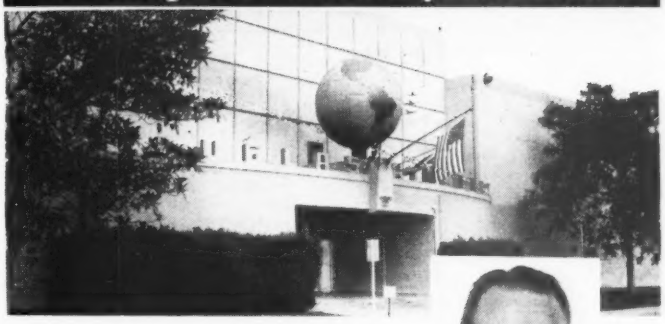

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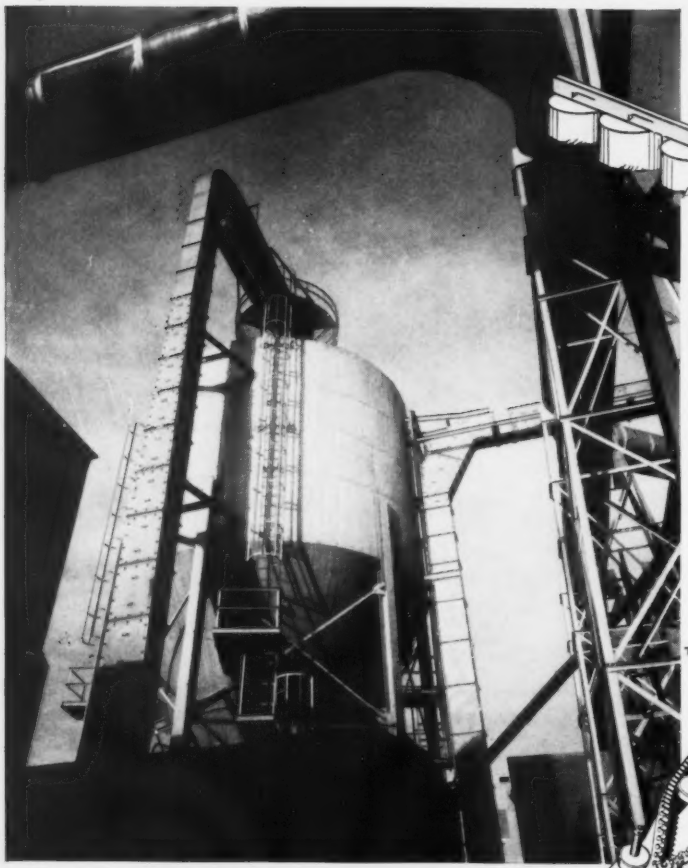
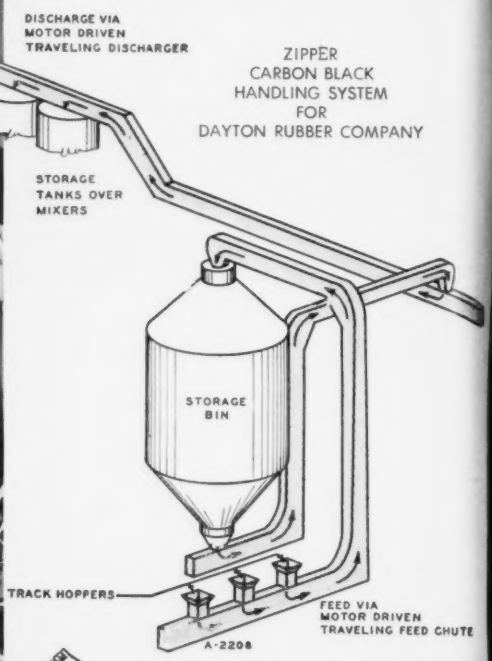
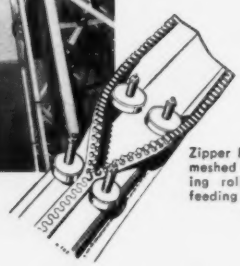


General view of S-A Zipper Conveyor-Elevator System for handling carbon black. Since the Zipper units operate in the open, they are protected from the weather by steel casings.



Sketch illustrates flow of carbon black through storage to processing via three ZIPPER belt conveyor-elevators. Note unit feeding from track hoppers which operates in two planes.



Zipper belt teeth are automatically spread, meshed and locked by means of ball bearing rollers as the belt travels past the feeding station.

Push Buttons Route Carbon Black Through Dust-Tight Zipper Distributing System

Remote control plus complete mechanization keynotes this conveying and storage system at the Dayton Rubber Company's Dayton, Ohio plant. Push buttons replace bag handlers — a single operator at a centralized control panel directs the 7-ton-per-hour flow of carbon black from hopper bottom rail cars, through storage, reclaiming and delivery to mixers in the plant.

Besides eliminating the excessive cost of handling the carbon black in bags, the system has greatly reduced degradation of the pelletized black and has practically done away with dust.

Incoming cars are spotted over the Zipper storage conveyor, which feeds from each one of the three track hoppers progressively selected at the control panel. At the 8-compartment storage bin, a motor driven swivel spout directs the flow of black to the proper compartment. In reclaiming, from storage, a Zipper Conveyor-Elevator discharges to a 238-foot Zipper that provides selective filling of the mixer storage bins.

If you have a dust or degradation problem, find out how much an S-A Zipper System offers you. Send for full data now.

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